THE JOURNAL

OF

THE DEPARTMENT OF AGRICULTURE,

VICTORIA, AUSTRALIA.

CONTENTS.—MARCH, 1915.

DEPARTMENT OF AGRICULTURE, VICTORIA

RED POLL DAIRY HERD

YOUNG BULLS FOR SALE

TO VICTORIAN DAIRYMEN

DAM	Date of Birth.	RECORD OF DAM.				PRICE		
		Milk lbs.	Average Test.	Fat lbs.	Butter lbs.	£	s	d.
	Sired by "NICOTINE" by ACTON DEWSTONE (imp.)							
Muria ...	25.7.14	7287	5·0	364·7	415¾	18	18	0
Pennsylvania ...	2.7.14	6340	4·0—5·2	271·9	310	13	13	0
Havana ...	17.8.14	6365	4·15	264·3	301¼	13	13	0
Kentucky ..	21.8.14	7905	3·96	313·3	357¼	15	15	0
	Sired by "BOICUM" by TABACUM							
Picotee ...	8.9.14	No Record.				5	5	0
	Sired by "BELMONT" by ACTON AJAX (imp.)							
Mongolia ...	20.9.14	Heifer.	No Record.			5	5	0
Zealana ...	15.10.14	,,	,,			5	5	0
	Sired by "GANYMEDE"							
Soudana ..	20.11.14	Heifer.	No Record.			5	5	0
Ontario ...	18.12.14	,,	,,			5	5	0

The prices are based approximately on the actual milk and butter fat record of the dam at the rate of 1s. per lb. of butter fat yielded.
See Journal of Agriculture, September, 1914.

Inspection by arrangement with Mr. E. STEER, Herdsman, Central Research Farm, Werribee.

Application for purchase to DIRECTOR OF AGRICULTURE, MELBOURNE.

THE JOURNAL
OF
The Department of Agriculture
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VICTORIA.

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THE MAIZE-PRODUCING INDUSTRY IN VICTORIA.

By Temple A. J. Smith, Chief Field Officer.

Introductory.

The production of maize for grain in Victoria has not developed as fast as might have been expected, the area cultivated being small when compared with the suitable land available in various parts of the State for such purposes. The rich flats on either side of the numerous rivers and creeks north and south of the Main Dividing Range lend themselves as specially valuable to maize growing, partly owing to the class of soil provided and also to the climatic conditions prevailing; the rainfall is sufficient and the summer season long enough and hot enough to ripen the crop. Where temporary dry spells are experienced, water for irrigation is generally available; this factor alone gives promise of a greatly extended area being cultivated when fuller advantage is taken of the permanent water supply. Already, in a small way, in more or less isolated cases, the crop has been profitably produced on such rivers as the King, Ovens, Kiewa, Mitta, Upper Goulburn, Upper Murray, and their many tributaries, and with a better knowledge of the crop's requirements and better systems of cultivation, seed selection and adaptation of varieties to their environment, undoubtedly still more profitable results will ensue.

At the present time the flats on the Snowy River at Orbost, the Tambo at Bruthen, and the Mitchell at Bairnsdale, are the heaviest maize yielders. This is largely due to the exceptionally rich nature of the soil and suitable climatic conditions. However, one cannot but be impressed with the fact that better systems are adopted here than in many other districts, which tend to bring about better results. Experience has, no doubt, had much to do in this respect; but, in addition, Eastern Gippsland has had the benefit of the time and thought which

some of the leading growers have devoted to the general improvement of the crop. Messrs. H. James (of Orbost) and Seehusen (of Bruthen), and others, have experimented for many years in methods of cultivation, seed selection, &c., and increased yields and better profits have resulted. There is no doubt that many other districts can be materially assisted in this respect if the same methods are applied.

Literature on maize culture is difficult to obtain, especially for local application, and the more knowledge the grower can employ and utilize with practice the greater chance will he have of obtaining maximum results under all circumstances.

The following figures, taken from the *Victorian Year-Book*, 1912, show the areas under cultivation in years 1906-7 to 1911-12:—

MAIZE AREAS AND YIELDS FOR VICTORIA.

Year.	Acres.	Yield.
		Bushels.
1906–7 ..	11,559	704,961
1907–8 ..	10,884	508,761
1908–9 ..	14,004	650,642
1909–10 ..	19,112	1,158,031
1910–11 ..	20,151	982,103
1911–12 ..	18,223	792,660

In the year 1901-2 there were 10,020 acres under maize, from which a return of 615,472 bushels was obtained. After that year the area of land under this crop was fairly constant until 1909-10, when it was increased to 19,112 acres, which produced 1,158,031 bushels. In 1910-11 the area was further increased to 20,151 acres, but the production was only 982,103 bushels. In 1911-12 the area declined to 18,223 acres, and the produce to 792,660 bushels, of which 225,860 bushels were in the county of Tanjil, 174,024 in Dargo, 159,562 in Tambo, 156,960 in Croajingolong, 23,217 in Bogong, 17,445 in Buln Buln, 11,240 in Benambra, 8,783 in Mornington, 8,421 in Grant, and 3,360 in Delatite. Maize is grown in other counties of the State, but to such a small extent that it accounted for only about ½ *per cent. of the total production* last season.

MAIZE.

1. *States Growing Maize.*—The only States in which maize is at all extensively grown for grain are those of New South Wales and Queensland, the area so cropped in these two States during the season 1911-12 being 321,628 acres, or nearly 95 per cent. of the total for the Commonwealth. Of the balance, Victoria contributed 18,223 acres, South Australia 97 acres, Western Australia 29 acres, and the Northern Territory 19 acres. The climate of Tasmania prevents the growing of maize for grain in that State. In South Australia prior to 1908 particulars concerning maize had not been specially asked for on the form used in the collection of agricultural statistics. In all the States maize is grown

to a greater or less extent as green forage, particularly in connexion with the dairying industry.

AREA UNDER MAIZE, 1875-6 TO 1911-12.

Season.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Northern Territory.	Federal Capital Territory.	Commonwealth.
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres
1875-6 ..	117,582	2,346	38,711	..	60	..	..	158,699
1880-1 ..	127,196	1,769	44,109	..	32	..	..	173,106
1885-6 ..	132,709	4,350	71,741	..	120	..	..	209,100
1890-1 ..	191,152	10,357	99,400	..	81	..	..	300,990
1895-6 ..	211,104	7,186	100,481	..	23	..	..	318,794
1900-1 ..	206,051	9,389	127,974	..	91	..	..	343,505
1905-6 ..	189,353	11,785	113,720	..	43	..	..	314,901
1906-7 ..	174,115	11,559	139,806	..	101	..	..	325,581
1907-8 ..	160,980	10,844	127,119	*549	87	..	..	299,579
1908-9 ..	180,812	14,004	127,655	1,223	181	..	..	323,875
1909-10..	212,797	19,112	132,313	240	153	..	..	364,585
1910-11..	213,217	20,151	180,862	619	46	19	..	414,914
1911-12..	167,712	18,223	153,916	97	29	19	69	340,065

* Particulars for previous years not available.

3. *Total Yields.*—The average yield per acre of this cereal, in common with the majority of crops, evinced a considerable falling off in the season 1911-12, the quantity harvested—9,039,855 bushels—being some 70 per cent. of the production of the previous season. The 1910-11 crop was, however, a record one, and exceeded 13,000,000 bushels. The average annual production of maize during the last decade was 9,078,678 bushels.

4. *Average Yield.*—In the following table particulars are given of the average yield per acre of the maize crops of the several States for the seasons 1901-2 and 1907-8 to 1911-12:—

AVERAGE YIELD OF MAIZE PER ACRE, 1901-2 AND 1907-8 TO 1911-12.

Season.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Northern Territory.	Federal Capital Territory.	Commonwealth.
	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.
1901-2 ..	22·98	61·42	21·96	..	10·16	..	..	23·86
1907-8 ..	28·13	46·02	24·31	*11·41	12·41	..	..	27·16
1908-9 ..	28·85	46·45	21·68	15·57	11·80	..	..	26·72
1909-10..	33·36	60·59	18·96	16·00	14·64	..	..	29·54
1910-11..	35·62	48·74	24·66	10·30	15·61	23·63	..	31·44
1911-12..	27·47	43·50	23·63	15·36	13·83	21·05	11·52	26·58
Average for 10 Seasons†	28·71	55·20	21·13	†13·54	14·14	..	..	26·84

* Particulars for previous years not available. † Average for five seasons.

The extraordinarily high average yield obtained in Victoria is due, in large measure, to the fact that the area under maize in that State is comparatively small, and is situated in districts that are peculiarly suited to the production of this grain. The yield in New South Wales is appreciably higher than that obtained in Queensland.

5. *Value of Maize Crop.*—The value of the Commonwealth maize crop for the season 1911-12 has been estimated at £1,637,692, made up as follows:—

VALUE OF MAIZE CROP, 1911-12.

Particulars.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Northern Territory.	Federal Capital Territory.	Commonwealth.
Aggregate Value	£1,013,971	£168,440	£454,695	£242	£85	£80	£179	£1,637,692
Value per Acre ..	£6/0/11	£9/4/10	£2/19/1	£2/9/11	£2/18/7	£4/4/3	£2/11/11	£4/16/4

AUSTRALIAN AND FOREIGN MAIZE PRODUCTION.

The following table gives the production of maize in Australia and in the leading maize-producing countries of the world. The figures show that of the total production the United States of America was responsible for 75 per cent.:—

PRODUCTION OF MAIZE IN VARIOUS COUNTRIES, 1910.

Country.	Production of Maize.	Country.	Production of Maize.
	Bushels.		Bushels.
United States	3,030,691,320	Servia	30,799,064
Hungary	199,046,208	Bulgaria	26,462,432
Mexico	184,870,296	Spain	25,534,528
Argentine Republic ..	163,463,336	Canada*	18,726,000
Rumania	100,461,424	Austria	16,215,600
Italy	94,914,528	Australia	13,044,081
Russian Empire ..	72,207,000	Uruguay	6,377,400
Egypt	65,589,536		

* Exclusive of British Columbia.

8. *Comparison of Yields.*—The average yield per acre of maize in the Commonwealth, of nearly 31½ bushels, may be regarded as highly satisfactory when compared with that of other maize-producing countries. Canada and Egypt are the only countries showing a higher average. The majority of the remaining twelve countries shown in the following table had average yields per acre ranging from 20 to 28½ bushels, while others were as low as 11½ and 14:—

AVERAGE YIELD OF MAIZE IN VARIOUS COUNTRIES, 1910.

Country.	Average Yield per Acre.	Country.	Average Yield per Acre.
	Bushels.		Bushels.
Canada	37·00	Servia	21·31
Egypt	34·26	Austria	21·21
Australia	31·44	Rumania	20·48
Hungary	28·47	Russia	19·73
United States of America ..	26·58	Bulgaria	17·52
Italy	23·71	Mexico	13·83
Spain	22·77	Uruguay	11·42
Argentine Republic ..	22·02		

9. *Oversea Imports and Exports.*—Except in the years 1902 and 1903, when, owing to the severe drought experienced in Australia, many of the maize crops failed, the Commonwealth oversea trade in maize has been practically insignificant. In the former of the years mentioned nearly 2,000,000, and in the latter considerably more than 1,000,000, bushels were imported. In 1908 and 1909 also, owing to the small harvests of seasons 1907-8 and 1908-9, the imports of maize were largely in excess of the exports. Details of imports and exports for the past ten years are as follow:—

COMMONWEALTH IMPORTS AND EXPORTS OF MAIZE, 1901 AND 1907 TO 1911.

Year.	Imports.		Exports.		Net Exports.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Bushels.	£	Bushels.	£	Bushels.	£
1901	188,423	24,764	533	75	*187,890	*24,689
1907	31,327	5,541	43,429	6,220	12,102	679
1908	271,723	49,291	2,018	444	*269,705	*18,847
1909	628,063	104,367	5,054	999	*623,009	*103,368
1910	133,730	19,554	12,557	1,904	*121,173	*17,650
1911	31,764	4,925	19,914	3,438	*11,850	*1,487

* Signifies net imports.

The principal countries to which maize has been exported from the Commonwealth are South Africa, New Zealand, and China, while the principal countries from which importations have taken place are the Argentine Republic, New Zealand, the United States, the Pacific Islands, South Africa, and Java.

10. *Prepared Maize.*—A fairly large quantity of corn-flour is imported annually into the Commonwealth, the principal countries of supply being the United Kingdom and the United States. During the year 1911 these importations amounted to 449,744 lbs., and represented a value of £7,142.

11. *Price of Maize.*—The average wholesale price of maize in the Sydney market is given in the following table for each of the years 1902 to 1911:—

AVERAGE PRICE OF MAIZE PER BUSHEL, 1902 TO 1911.

Particulars.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1909.	1910.	1911
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Average price per bushel	4 10	4 1	2 4	3 3	3 0	3 2	4 7	4 2	2 11	3 0

Average, 3s. 6½d.

The largest area under maize in 1910-11, viz., 20,151 acres, is small compared with the amount of land in the State capable of producing the crop profitably.

The average yield in Victoria is considerably higher than in any of the neighbouring States, being 35.20 bushels per acre; the next best is New South Wales, 28.71, while Queensland 21.13, South Australia 13.54, and Western Australia 13.34, come a long way down the list. Even the mean average of the United States of America, the largest maize-producing country in the world, is only 25.16 bushels per acre—less than half that of Victoria. The mean average of South Africa is 23.20 bushels. These figures suggest that Victoria should be capable of producing greater quantities of maize, in doing which she could afford to bring down her average considerably, and yet hold her own with the leading maize-growing countries of the world. Yet leading growers assert that her present yield could easily be increased by 10 bushels per acre under proper management, consequently it should be possible to grow greater quantities and, at the same time, maintain the average yield.

Taking the average price of maize in years 1902-11 inclusive (3s. 6½d. per bushel), and the mean return of 35.20 bushels per acre, the return equals £9 4s. 9d. per acre.

It will readily be seen that the cost of growing maize will vary according to the size of the crop and general conditions under which it is worked, but an average of £4 per acre should cover the cost of producing a 35-bushel crop ready for market, including bags, picking, carting, and cultivation, leaving an average net profit of £5 4s. 9½d. A nice return, taking good and bad seasons together, and, at the same time, realizing that much of the expenditure incurred would not leave the grower's pockets should he decide to do the work himself. There are authentic cases of individual yields reaching as high as 140 bushels per acre, and on such occasions the profits are very satisfying.

In districts remote from a railway, maize is fed to pigs, and in that way walked to market instead of being carted, and when the price falls below 3s. per bushel it would probably pay better to feed in this way than to sell as grain, even to nearer markets. On the Cann River, in North-Eastern Gippsland, practically all the maize grown is utilized in this way, and pigs are travelled distances of over 100 miles to the railway station. Twelve miles per day is considered good travelling, and the loss in value due to the effect of the journey is estimated to be 5 per cent. on the pig. It is not unusual to see droves of 600 to 1,000 pigs brought in in this manner, the system adopted in droving being to send a waggon ahead loaded with maize cobs, which are dropped in front of the pigs as an inducement to follow. Drovers keep stragglers up with the mob, while a spare waggon is in attendance to carry any pigs that knock up or receive injuries that may temporarily prevent their travelling. Land 100 miles and more from a railway carries a value per acre of from £8 to £15, owing to the profits made through the combined pig and maize industry. Other remote portions of the State might well be turned to good account in the same way.

Apart from the ordinary uses for which maize is grown in Victoria, there are possibilities of various other industries being developed through the growth of this crop, perhaps the most important of which is the

manufacture of sugar from such sources, on which subject Mr. F. T. Stewart, Murrysville, P.A., U.S.A., supplies the following interesting matter on the subject of "Maize and its New Uses," and "The Structural Peculiarities of Maize and their Relation to the Practical Extraction of Sugar Under the New Treatment":—

"Maize and the sugar cane are much more closely related to each other than they are to grasses of the bamboo type. But in all, the fundamental element or unit of structure is the same—the node and its connected parts, the internode and germative bud. In its present form the sugar cane has the habit and characteristics of a perennial grass—maize that of an annual. It is no discredit to the former to say that almost a century ago Sir Humphrey Davy discovered that the common tussock grass, or cocksfoot (*Dactylis glomerata*), which often invades the cultivated sugar cane fields, in all particulars except size is the nearest akin to the sugar cane—a disreputable poor relation of the latter -which unasked comes to court its company and share its fortune. Davy found it to contain 18 per cent. of sugar. The fact is that normally all the grasses contain sugar. Cane sugar is the highest product of plant metabolism—out of it even cellulose is formed—and the sugar is the common food material, formed and stored principally within the culms or stalks of all the grasses. The normal sugar content in most species does not exceed 6 or 7 per cent. But I find that in the case of many of the annual grasses a forced accumulation of sugar may be produced when they are grown under slightly abnormal conditions.

"This paves the way for the statement of what is now not only a legitimate generalization, but an accepted fact—that maize under certain conditions of growth and development is *potentially a sugar cane.*

"Both maize and the sugar cane are so constituted structurally and functionally as to enable them to form and store away the food materials upon which their continued growth and existence depend. This they do in obedience to the same inexorable law, and for the same purpose which leads the bee to store up honey within the cells of its hive. Due regard to economy will have it that the amount of the food supply shall be proportioned on a liberal estimate to the future demand that will be made upon it; just as in forming the crowded hexagonal cells of both plant and comb, regard is had to the use of the smallest quantity of the elaborated cell-forming material—the wax or the cellulose—that will give the largest storage capacity within a given space. But the parallel between the two cases does not end here.

"The supreme crisis of its life comes to the corn plant when the immature ear is removed or destroyed. Promptly in that case, and heroically as we would say, if we think of it as an intelligent creature, an effort is organized to meet the emergency, to repair the loss, and to avert the impending catastrophe. To this end a reserve force, which never in the ordinary life cycle of the plant has any such demand made upon it, is then called into action.

"In brief, the result is that the plant at once enters upon an entirely new condition of development, and its efforts are rewarded with an indefinite prolongation of its life, with the purpose plainly of maturing a new ear; fresh stores of the precious food materials are produced with amazing rapidity, and rushed into the natural receptacles provided for them within the stalk, until the sugar has accumulated beyond 100 per

cent. more than it originally contained. It is scarcely necessary to say that this transformation is brought about effectively only under human control directed closely to the end in view. The results in sugar accumulation are then as uniform and constant as in the sugar cane in the tropics. In maize, the stalk is a column composed of successive "joints" (the nodes and internodes), which, in their intergrowth, are permanently fused together, so that when combined they constitute a single individual. In sugar cane the joints, when mature, have no vital connexion with each other, and each may be regarded as a separate individual. In cane, the reserve sugar is distributed quite uniformly through the pith cells or parenchyma of the internodes, but little of it is found in the nodes. In maturing, the joints ripen successively from the foot of the stalk upward. In maize, on the contrary, the sugar is stored in the greatest abundance within and directly above and below the node, and at that time there is a constant interchange and distribution of this material as it is formed throughout the whole length of the stalk, the upper joints—except the last two—maturing at the same time as the lower. Equally important with the sugar is the pulp and cellulose product, consisting of the substance of the whole stalk in a highly purified condition after the sugar has been extracted, the whole of it ready to be reduced at once into the finest quality of pulp and cellulose. On account of the absence, in this case, of the hard silicious coating which covers the cornstalk when the grain has ripened, and which prevents the best of the fibrous matter, which it contains, from being utilized, the pulp obtained is doubled in quantity and is of a much superior quality.

"A necessary incident to the sugar process is the removal of the immature ears and husks from the stalk. This field stuff amounts to about 80 per cent. of the weight of the stalk, and adds a third class of products obtained from the same plant, utilized principally in the manufacture of food products and alcohol.

"The discovery of the fact that Indian corn can be made available for sugar production, and that under the proper conditions of treatment it takes at least equal rank with sugar cane and the beet for that purpose was demonstrated conclusively ten years ago. It was found that the plant then is enabled to develop a latent and hitherto unsuspected power which it possesses of transforming a large part of its other organic constituents into true sugar. Accurate tests of the sugar content of the juice of the best varieties of field corn grown in different parts of the United States have been made continuously from the year 1897 until the present time. During the seasons of 1898 and 1899 and 1900, the final crucial tests were made, which ended all controversy as to the capacity of the plant under the given conditions to produce not less than an average of 13 per cent. of sucrose, or true cane sugar, in the juice as a constant. Since then, the investigation has been extended over the whole field of the proper utilization of the plant which the first discovery was seen to open up. One thing is now plain. The development of this business is yet in its earliest infancy. What the final outcome shall be can scarcely be foreshadowed. But it is safe to say that the limit of the value of the plant in no single direction has yet been reached. The fine results reached in the work at the experimental plant at Murrysville the past season, and the final tests of the machinery, prepare the way for

the rapid introduction of the processes into regular use next year on the most extensive scale, wherever corn can be grown to the most advantage for these purposes. From refined maize cellulose, the same as from cotton, all the standard products are now producible at low cost, which are indispensable for common use and in the arts—such as collodion, celluloid goods, sizing and surfacing and paper-filling preparations, varnishes, transparent films, carbon filaments for incandescent electric lights, artificial silk, gun cotton, smokeless powder, cellulose solutions, &c., &c."

(To be continued.)

THE mangel, the sugar-beet, and the garden-beet are all improved modifications of the same original wild plant; its natural *habitat* is the sea-shore; and it wants some salt.

MANGELS improve by storing for a month or two before use.

EXCEPT on very rich soils mangels require nitrogen as well as phosphates in their manure. A little common salt applied broadcast helps them on.

FRUIT FORWARDED TO NEW SOUTH WALES.

UNIFORM SYSTEM OF BRANDING.

Owing to the difficulties which have been experienced in connexion with the transport of fruit forwarded from Victorian stations to Sydney, and in compliance with certain representations which have been made by the Fruit Section of the Sydney Chamber of Commerce, it has been decided by the Victorian Railway Commissioners to introduce a uniform system in connexion with the branding of cases, with a view to facilitating the transhipment at Albury and delivery at Darling Harbor, and the following instruction in regard thereto has accordingly been issued to the stations concerned:—

"When truck-load consignments are forwarded by one sender to one consignee, the cases should be stencilled at each end with an over-riding brand, independently of any brands or addresses which may be shown for the information of the consignee (or agent) in effecting deliveries of consignments that are forwarded for distribution.

"It is advisable that the over-riding brand should be the first initial of the consignee's surname, also a figure to denote the day of the week, for instance:—A consignment of 350 cases forwarded to Smith and Son on a Wednesday should be stencilled S.3.

"The notice of any likely senders is directed to this matter, with a view to obtaining their co-operation in carrying out the arrangements, and no notice will be taken of different brands for the one consignment."

BEE-KEEPING IN VICTORIA.

By F. R. Beuhne, Bee Expert.

(Continued from page 71.)

XXVI.—THE HONEY FLORA—(*continued*).

THE MESSMATE (*Eucalyptus obliqua*).

(Fig. 15.)

The Messmate, in South Australia and Tasmania called Stringy Bark, is generally a straight stemmed tree of rapid growth attaining a maximum height of 300 feet in country with a good rainfall, usually found in the company of Stringy Bark (*E. macrorrhyncha*) and Peppermint (*E. amygdalina*), but also occurring in a stunted form on sandy heath ridges, with Apple Gum (*E. Stuartiana*) and Brown Stringy Bark (*E. capitellata*.)

The wood is pale to brownish yellow in colour, usually free in the grain and then used for splitting into posts and rails and to a lesser extent into palings and shingles, it also supplies a large portion of the ordinary sawn hardwood for building purposes.

The bark is very fibrous but rather soft and fragile, inside light brown, outside greyish or after fires black; it ignites easily and the Messmate therefore carries bushfires along more than most other trees. The bark is to some extent used for roofing rough buildings, but is not so suitable for this purpose as that of Stringy Bark.

The leaves are scattered sickle—or sickle—lance-shaped, equally green and shining on both sides; their lateral veins not very spreading, but rather prominent, the marginal vein somewhat removed from the edge of the leaf. The leaves of young saplings are broad, somewhat heart-shaped.

The clusters (umbels) contain from three to twenty flowers, and grow from the shoulders of leaves or sideways from the branchlets. The stalks of the umbels are slender and rather long, the flower buds long, tapering towards the stalk, and have a half-round or slightly pointed top. The fruit is cup-shaped with three to five cells (compartments).

The buds appear from nine to eleven months before blossoming, which takes place generally in February. The honey is one of the darkest, particularly so in wet locations, reminding somewhat of molasses. Pollen is gathered by the bees from the blossom, and as the Messmate blooms late in the season it may be found useful in building up colonies for autumn and supplying them with winter stores.

THE BROWN STRINGY BARK (*Eucalyptus capitellata*).

(Fig. 16.)

This tree attains a maximum height of 200 feet, but, as a rule, is not so tall. It is widely distributed over Victoria, appearing in the Eastern and moister half as a tall tree, but near the Grampians and the South Australian border in a dwarf state. It furnishes a good timber for all purposes for which Stringy Bark is used.

The bark in appearance resembles that of Messmate, but is harsher and more stringy, and reaches far up into the branches, the branchlets alone being smooth.

The leaves are lance-shaped, or lance slightly sickle-shaped, rather thick, dark green, usually more shining on the upper than the lower side; the lateral veins moderately spreading, the marginal vein distinctly removed from the edge.

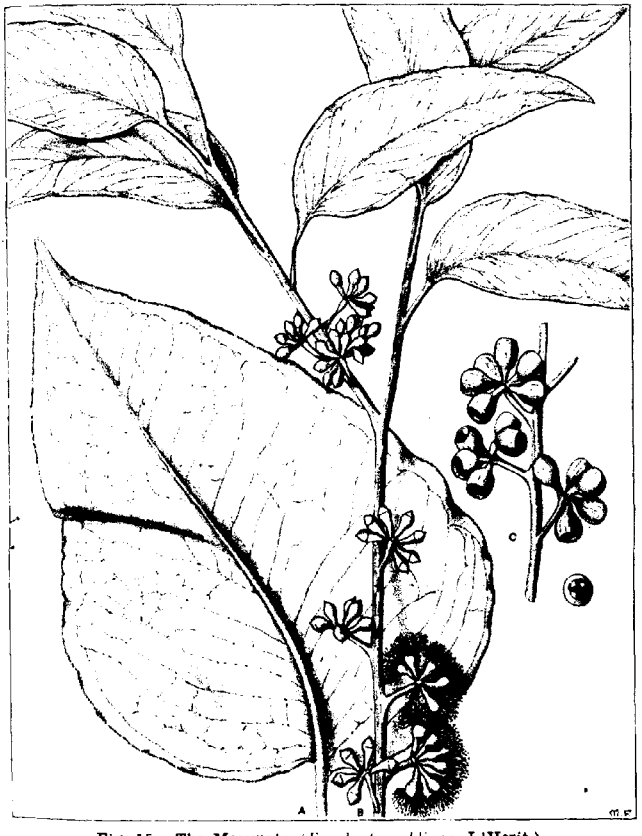


Fig. 15.—The Messmate (*Eucalyptus obliqua*, **L'Herit.**).

The umbels are in sprays at end of branchlets, or single lateral or at shoulders of leaves bearing from four to fifteen flowers, not of large size. The buds taper only slightly towards the stalk, while the top is rounded or blunt-pointed. The fruit is almost round with the points of the crown well projecting and of a dark-brown colour when the fruit is dry.

The buds appear fifteen to eighteen months before flowering, which occurs two years in succession, in February and March, so that for some time there are two generations in sight. This is also a characteristic of the Red Stringy Bark (*E. Macrorrhyncha*), Manna Gum (*E. viminalis*) and Long-leaved Box (*E. eleœophora*). As a nectar-producing tree it is not very reliable, being like the Red Stringy Bark, somewhat

Fig. 16.—The Brown Stringy Bark (*Eucalyptus capitellata*, **Sm.**).

irregular, failing altogether some years, particularly in dry districts. It is, however, very useful as a pollen bearer.

The honey is one of the darker ones, but fairly clear, of good density and pleasant flavour, and preferred to other honey by people used to it. When heated it throws off a considerable amount of froth, and as it is inclined to candy it should always be heated to 160 deg. Fah[.

before it is drawn into tins for market, otherwise a layer of froth will be found on top of the honey some time after it is tinned.

The Brown Stringy Bark differs from the Red (*E. macrorrhyncha*) chiefly in the smaller flowers, blunter or less pointed, and somewhat angular buds of the first-named, while the projecting valve flaps of the ripe fruit which are common to both separate them from other Stringy Bark trees.

THE RED STRINGY BARK (*Eucalyptus macrorrhyncha*).

(Fig. 17.)

The common Stringy Bark tree of Victoria, widely distributed over the State, found generally on comparatively sterile ridges and ranges. It does not attain the height of Messmate (*E. obliqua*), nor does it ascend generally to the high elevations at which the latter is found. Both trees, however, frequently occur intermingled; it generally grows in the company of Red Box, Grey Box, Yellow Box, and Long-leaved Box in the drier districts, and with Manna Gum and Narrow-leaved Peppermint (*E. amygdalina*) in other situations.

The wood is hard, mostly of a deep reddish brown colouration, but also occurring pale in colour; it is durable, free in grain, and therefore split into palings, shingles, and fence rails; it is also sawn into commercial timber, and furnishes a fair fuel. The bark is thick, fibrous, and tough, from light to dark-grey in colour on the outside, reddish-brown inside; the inner layers are so tough as to be available for rough cordage.

The leaves are scattered on the branchlets, lance-shaped, equally green on both sides, the veins moderately spreading, the marginal one distinctly removed from the edge. The umbels or clusters of from four to nine flowers occur mostly singly; the buds sharply pointed, tapering sharply towards the point as well as the stalk; the fruit is round, three and less frequently four celled.

Like the other Stringy Barks, it is not a very reliable tree as a honey-producer, but yields better in Gippsland and moist localities generally than in the drier parts of the State. The honey is clear, but rather high-coloured, but of good flavour, and when thoroughly ripe, of fair density; it candies rather readily, but not solidly, and should always be heated to 160 deg. Fahr. before being marketed, otherwise a froth will form on top of the honey after it has been standing for some time. Pollen is gathered from the blossom; the normal flowering time is February, and the buds appear from fifteen to eighteen months previously.

The Red Stringy Bark is more subject to periodical ravages by the caterpillar of the cup moth than any other Eucalypt. Square miles of forest are sometimes devastated by these pests, the value of the trees to the beekeeper being destroyed for several years. The trees themselves are much injured.

THE WHITE STRINGY BARK (*Eucalyptus eugenioides*).

(Fig. 18.)

A tree with a straight stem attaining a height of about 200 feet, occurring mostly in elevated poor grounds, but also in sandy low lands from the Dandenong Ranges and their vicinity to hilly and mountainous places in Gippsland and to Twofold Bay.

The wood is pale coloured, splits well into shingles, palings, rails, and slabs, and is also sawn into building timber; it is more lasting than that of the Red and the Brown Stringy Bark, but is inferior for fuel.

The bark is fibrous, very tough, reddish-brown inside, and is the best kind for rough roofing, and on this account thousands of straight

Fig. 17.—The Red Stringy Bark (*Eucalyptus macrorrhyncha*, **F. v. M.**).

valuable timber trees have been destroyed, one single sheet of bark being taken off the standing tree.

The leaves are scattered on the branchlets, broad lance or slightly sickle-shaped, dark-green and shining on both sides, the veins somewhat faint, the marginal vein somewhat removed from the edge. The flowers four to twenty in single umbels at shoulders of leaves, or sometimes in a small spray; buds conical, fruit cup-shaped, but without the projection of the valve flaps of the Red and Brown Stringy Bark ripe fruit.

The White Stringy Bark blossoms in January and February. Nothing definite is yet known as to the length of time it is in bud, and how often it flowers. It yields pollen to bees. The honey, like that of other Stringy Barks, is rather dark, and has the same characteristics.

Fig. 18.—**The White Stringy Bark** (*Eucalyptus eugenioides*, Sieb.).

THE YELLOW STRINGY BARK (*Eucalyptus Muelleriana*.)

(Fig. 19.)

The Yellow Stringy Bark, so-called because the bark is very yellow when freshly cut; the timber is also yellowish. The stem is straight, rather massive, with moderately spreading branches, and a fibrous dark-grey bark. The leaves of aged trees are lance-shaped, and more or

less unequal sided, rather dark-green in colour, equally shining on both sides, and usually three to five times as long as broad. The seedlings have narrow lance-shaped opposed leaves. In young saplings the leaves are rather broad lance or egg lance-shaped. The stems of saplings and young trees are somewhat smoother than those of other Stringy Barks.

Fig. 19.—The Yellow Stringy Bark (*Eucalyptus Muelleriana*, **Howitt.**)

The clusters of flowers appear usually solitary; the buds are from three to twelve in the umbels, tapering towards the stalk, the lid (top) half egg-shaped, or half-round, smooth, and occasionally slightly pointed. The fruit is almost half-round, four celled, less frequently three to five celled, indented with small pits, and usually gray-green in colour.

In Victoria the Yellow Stringy Bark has an extensive range in the southern part of Gippsland. It also occurs in the Grampians and other places nearer to South Australia. It is a valuable splitting timber, and exceedingly durable in contact with the ground.

As to its value as a nectar and pollen yielder, the character of the honey, time of flowering, no definite information is, so far, available, and the writer hereby invites information on this subject from bee-keepers able to give such in regard to this tree or any other Eucalypt on which the information in these articles is incomplete.

(To be continued.)

SUMMARY OF METEOROLOGICAL OBSERVATIONS,

CENTRAL RESEARCH FARM, WERRIBEE, 1914.

(Supplied by Field Officer G. S. Gordon.)

The following summary of Meteorological Records for the past year at the Central Research Farm, Werribee, will be of interest :—

1.—RAINFALL AND EVAPORATION.

Rainfall.		Evaporation from free Water Surface.	
	inches		inches.
During 1914 (304 points in December)	13·24	During 1913—	46·438
Rainfall during wheat-growing period, 1st May—31st October, 1914	5·09	During 1914—	50·548
Rainfall during 1913 (505 points in March) ..	16·43		
Average for 42 years	20·29		

2.—TEMPERATURES, 1914.

Mean Air Temperatures.	Mean Soil Temperatures			Range of Temperatures.	
	inches	°	°	°	°
Dry bulb, 59·4° F. ..	1	70·9 max.	50·6 min.	Highest 98·3	Lowest 32·1
Wet bulb, 55·8° F. ..	6	63·6 ,,	52·6 ,,	,, 84·7	,, 39·0
Max., 69·6° F.	12	61·6 ,,	56·8 ,,	,, 78·0	,, 38·8
Max., 48·6° F.	24	60·2 ,,	58·6 ,,	,, 73·5	,, 43·5

3.—HOURS BRIGHT SUNLIGHT, 1914.

There were 1,906·5 hours of bright sunlight, 1914. This gives a daily average of 5·2 hours.

THE WALNUT.

(Continued from Page 80.)

C. F. Cole, Orchard Supervisor.

VARIETIES.

Too much importance cannot be placed upon the selection of a variety, or varieties, when planting out an area of walnuts for profitable nut production. It is far better to delay planting until a suitable variety is obtained than to rush in and plant out unknown seedling trees raised from a mixed lot of nuts obtained from trees of doubtful type or origin.

The cost of producing nuts of a high marketable value from selected types is no greater than producing nuts from trees of poor types having a low or no marketable value.

With the walnut great variation exists in individual seedling trees. It is from this variation that desirable varieties have been, or still may be, established, each variety having originated from one particular tree which was selected owing to its possessing certain qualities. Having discovered a tree with desirable qualities for profitable nut culture, budding or grafting must be resorted to, if the selected variety is to remain true. If the walnut is to be cultivated upon sound lines worked trees from selected seedlings, or established and named standard varieties, must be planted.

The variations which occur in seedlings grown from nuts selected from one individual tree are very marked, not alone does the type of foliage differ, but the growth, vigour, time of becoming vegetative in the spring, the prolificacy of nut production, the quantity of catkins and pollen produced, size, quality, flavour, and colour of the meat (kernel), time of ripening, resistance to diseases, are all dominant features in variation. Although such variations occur, yet there are certain characteristics that may be recognised as belonging to a certain type, *e.g.*, take the old hard-shell type common in Victoria, which produces small, roundish nuts. Although nuts gathered from individual trees vary in size and somewhat in shape, as illustrated in Plate 20, yet there is a certain degree of similarity, showing a fairly uniform type in shape, colour, and growth. The nut in the lower right-hand corner of the illustration is a fairly good example of the true type of this common hard-shelled variety. To secure trees that would produce nuts true to this type, it is necessary to have them worked, as already mentioned under this heading, by budding or grafting from scions taken from the type tree.

If the common practice of sowing the nuts is followed, the variation in size, &c., already depicted in the illustration must be expected.

The writer does not recommend the planting of this common hard-shell variety for profitable nut production. There are far superior

seedlings in every respect that await selection growing in various parts of the State. This example is chosen to warn intending planters against haphazard selection which, if put into practice, will mean future disappointment, financial and otherwise, besides the loss of many years of labour. This variation that occurs in the walnut has played an important part in establishing the walnut industry upon sound lines in California, and should be the basis on which to work in Victoria.

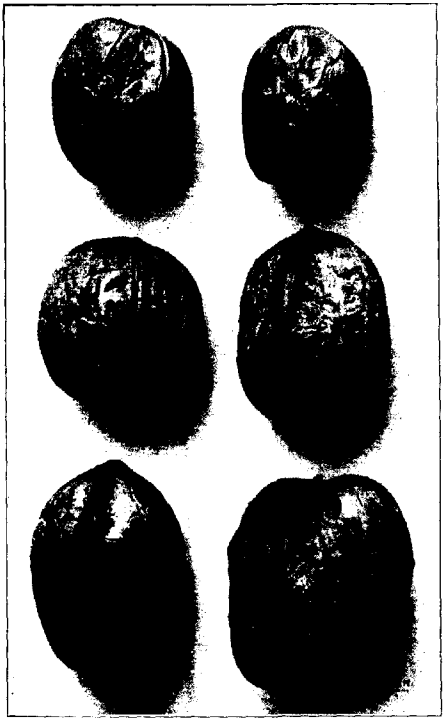


Fig. 20.—English Seedling Walnuts, various types, natural size.

It is partly through variation in foliage that the walnut can be grown to greater success in warm localities, as the selection of a large-foliaged variety is valuable in protecting the developing nuts and wood of the trees from sun-burn. In localities subject to severe late frosts variation again plays its part. The selection of varieties that produce their catkins and pistillate bloom late in the spring makes the production of nuts a greater certainty. Illustrations 21, 22, 23 show three distinct

types of foliage selected from individual seedling trees of the hard-shell type. The difference in variation is so obvious that a minute description is unnecessary. From statements already quoted, the reader will readily recognise that Plates 22 and 23 are both large types. This class of foliage is especially valuable for warm localities, whilst Plate 21 is of a poor, narrow type, affording scanty shade and protection to the nuts, &c. Because seedling trees have large abundant foliage it is not to say that they will produce large nuts, but when they do so, and the nuts are of high quality, then it is to such a type that the selector should turn. The writer advocates such a standard type for all climatic conditions where the walnut will thrive. It must be here stated that walnut cultivation has not yet assumed the proportions of an industry, for to the

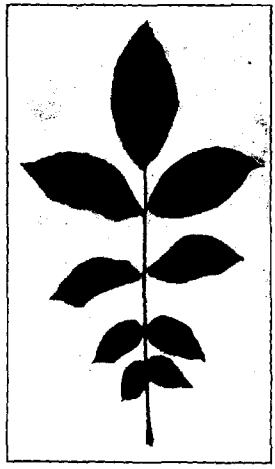


Fig. 21.—Poor Type of Foliage, English Seedling Walnut, quarter natural size.

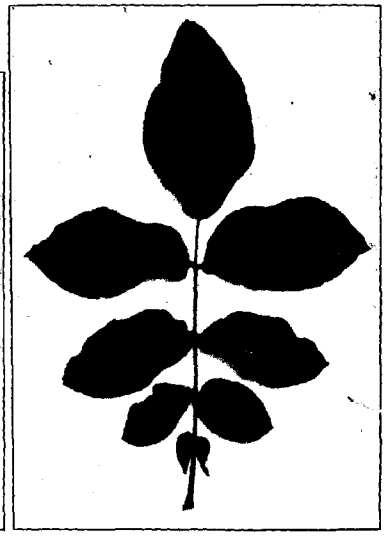


Fig. 22.—Good Type of Foliage, English Seedling Walnut, quarter natural size.

writer's knowledge the pioneering stage upon absolute sound lines has not yet been started. The improvement of the walnut by careful selection, by hybridization or otherwise, is necessarily slow owing to the long time the trees take to come into bearing. Yet, if the production of this valuable commercial nut is to be upon sound lines, it will be necessary to make a proper start. There are many seedling trees, both hard and soft shelled, in full bearing in the State, and many carefully-selected high-standard varieties which can be imported from California in the form of grafted trees, consequently the field of labour and difficulty of type selection have been greatly minimized, thus saving many

years of patient waiting to prove or disprove the commercial value of the nuts, and the partial or total resisting powers of varieties to diseases, particularly bacteriosis.

If imported varieties or local seedlings are selected for experimental purposes, a moist locality suited to walnut culture and with bacteriosis prevalent should be selected for proving beyond all doubt the immunity of the selected varieties against this worst disease of the walnut. A warm or dry locality should not be chosen, as the atmospheric conditions during the spring and early summer months are generally unfavorable to the development of the disease, which requires a moist and humid climate. Even if trees are planted and growing in a disease zone, it might be many years before they will show signs of infection. Old trees

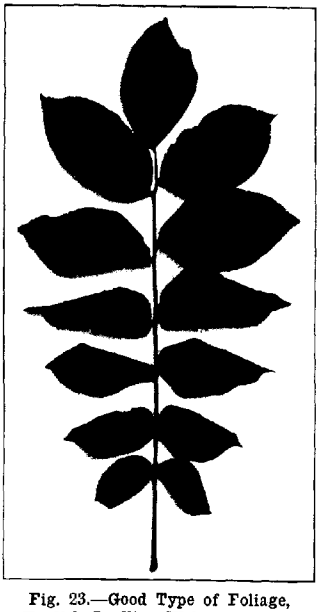


Fig. 23.—Good Type of Foliage, English Seedling Walnut, quarter natural size.

Fig. 24.—A Prolific Cropper (Variety, English Seedling).

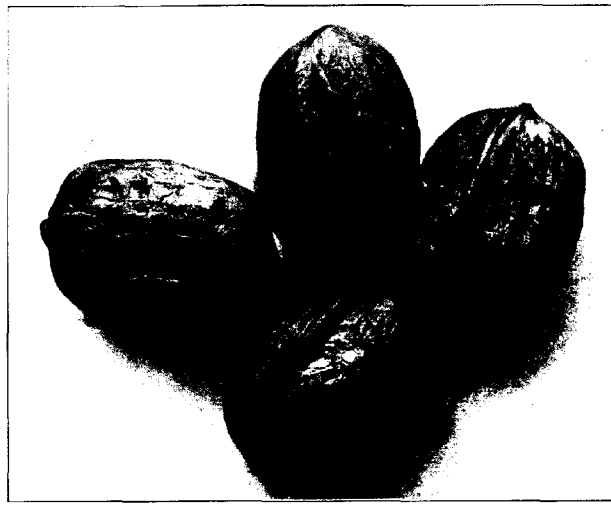


Fig. 25.—Selected English Seedling Walnuts, natural size.

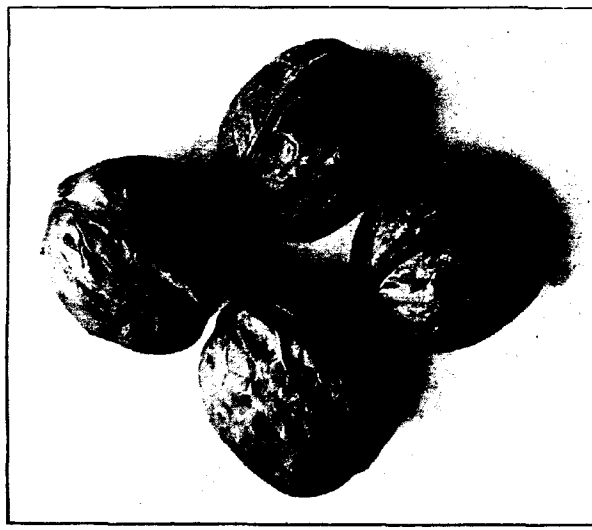


Fig. 26.—Selected English Seedling Walnuts, natural size.

growing in a disease-infested locality bearing crops of good nuts showing no signs of attack upon any portion of the tree may be looked upon as disease-resisting, and should receive attention; likewise those slightly attacked, for, although not totally immune, such trees may be looked upon as reasonably free from attack and far more profitable to grow than trees very susceptible to the disease.

The most important quality to be considered when choosing selected varieties for planting is that of cropping. Whatever other qualities a nut may have, if the variety is a recognised light cropper, it should be discarded. Only varieties producing good commercial crops and regular bearers should be chosen. Another important consideration is the age at which the trees begin to crop, some varieties coming into bearing much earlier than others. Where growing under favorable conditions many seedling trees in Victoria are very prolific, and produce heavy yields of nuts of fair quality. The cluster of developing nuts illustrated in Plate 24 was gathered from a tree that has heavy annual crops, but as it is subject to bacteriosis is not suited to a moist district.

A medium-sized nut, well filled with meat of good quality, is to be preferred to a large nut poorly supplied. Indeed, large-sized nuts do not command as high a price as well-filled smaller ones. Nuts should be of such a size as not to go through a square mesh grader of from 1 inch to 1¼ inches square; they should have light-coloured meat of sweet flavour, the pellicle, or meat coat, should be pale, the shell smooth and free from conspicuous ridges, or grooves, pale and symmetrical, closely sealed, and not easily cracked.

Varieties producing thin shelled nuts easily opened by slight pressure, although probably preferred by the eater, are not so valuable to a grower as the hard-shelled variety, for, during the gathering and drying many nuts open, and the meat is spoilt; others, again, are injured by handling and transit.

That there are seedling trees growing in Victoria producing nuts worthy of attention, and far ahead of the majority of small, ill-shaped hard-shelled types, the two varieties of nuts gathered from old trees shown in Plates 25 and 26 will demonstrate. Plate 25—Description of nut: Oval, elongated and symmetrical, uniform, shell fairly firm, having a smooth surface, colour light-brown, opens somewhat easily owing to being rather poorly sealed at the apex, pellicle or seed coat pale brown, meat plump and well filled, easily extracted, flavour mild and sweet. Dimensions, passed through a hole 1 3-16 inches square with slight pressure. Weight of average-sized nuts, 9 months, stored, 42 to the 1 lb. Avoirdupois, weight of meat from 42 nuts, 10⅛ ounces; shell 5½ ounces. Plate 26—Description of nut: Rounded, oval, symmetrical, uniform; shell smooth, hard, moderately thick, light brown in colour, strongly sealed, pellicle or meat coat pale straw-colour, meat full and heavy, easily extracted, flavour good, sweet, having a true nutty flavour. Dimensions, passed through a square hole 1 2-16 inches and 1 3-16 inches in size. Although these two types are not so large as the selected Californian varieties, they are well filled nuts, weighty for their size, and of very fair shell colour; the meat is attractive when extracted, and of

good flavour. The smallest nuts gathered from both types did not pass through a ¾-inch square hole. For the benefit of those readers not conversant with the Californian types, a reproduction from Bulletin

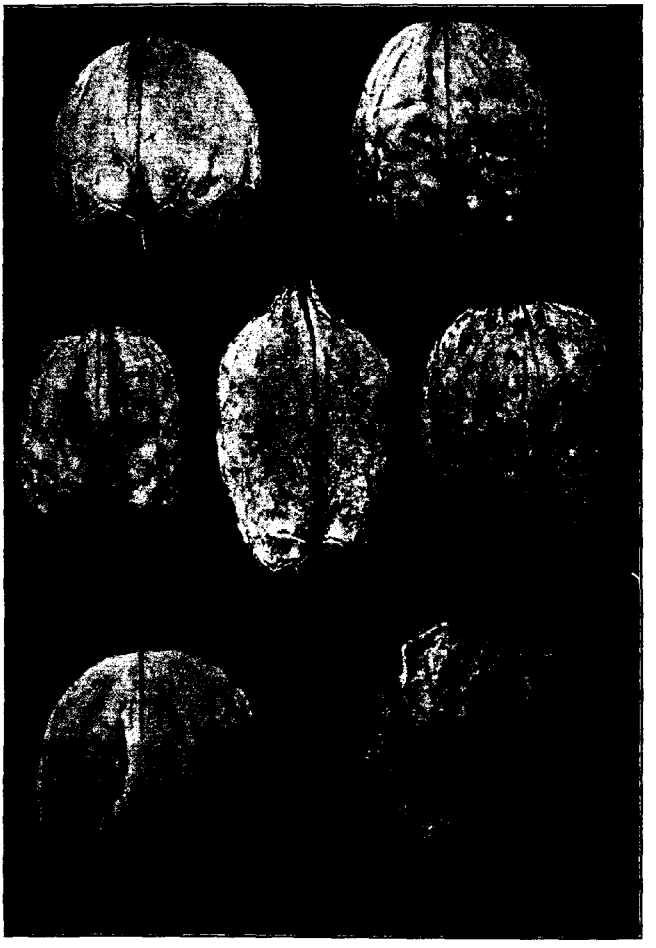


Fig. 27.—Varied Types of Californian Varieties, natural size.

No. 231, Berkley, California, on walnut culture, is shown in Plate 27. Victorian seedlings varieties depicted in Plates 25 and 26 can be compared.

The following is a selected list of varieties recommended for introduction into Victoria from America. The young trees to be either budded or grafted:—

Chase—Vegetates early; foliage abundant and thrifty.
Concord—Vegetates late; foliage abundant and vigorous.
Eureka—Vegetates medium late; foliage abundant and thrifty.
Franquette—Vegetates very late; foliage abundant and thrifty.
Placentia—Vegetates early; foliage abundant and thrifty.
San Jose—Vegetates late; foliage rather sparse.

Several of the nuts depicted in Plate 27 are slightly larger than many of the best varieties grown in California and illustrated in the Bulletin.

To be continued.

EFFECT OF DEHORNING.

In an experiment with ten cows at the Kansas Agricultural College it was found that for the first five days after dehorning the cows lost an average of ½ lb. of milk a day. At the end of the fifth day they began to return to their normal flow, and in a few days eight of them were giving a substantial increase. The greatest gain was with the cows that had been hooked and driven away from their feed previous to the dehorning. The two that did not increase in production were the "boss" cows of the herd. Cattle that are dehorned before the coming of warm weather and flies usually heal without any trouble. Much time and trouble is saved by dehorning the calves with caustic potash. This should be done before the calf is a week old, or a stumpy horn will develop, which will have to be removed later with clippers or saw. Scrape the button or young horn with a knife until it is red. Then moisten it and rub it well with a stick of caustic potash, or with household lye, being careful not to get it in the skin around the horn, as it is very irritating to the calf's tender skin. This should be repeated in a few days if a deep scab does not form in the centre of the horn.—*Farmers' Gazette*, 23rd October, 1914.

THE OLIVE.

L. Macdonald, F.R.B.S., F.R.H.S., Horticulturist, Dookie Agricultural College.

(Continued from page 471, Vol. X., 1912.)

VARIETIES.

In olive culture, as in the culture of other fruits, there is probably no greater factor in determining the balance of success and failure than the variety. It has long been recognised that the right kind is unquestionably the most effective weapon to put into the hands of the producer. This is especially so where the conditions are such that the maximum of production, even with the best kinds, is not high, owing to the prejudicial effect of soil, or climate, or both, the net returns being diminished owing to the high cost of labour, defective appliances, or where the stress of competition is great.

Hitherto it would appear that the importance of the variety as a factor in the economies of this industry has not been given due consideration. This is evident by the ever-increasing number of varieties, many of which are only moderate oil yielders, and many quite worthless for commercial purposes as well as by their haphazard cultivation and the confusion into which the nomenclature of the olive has fallen. It would seem by the evidence before us, notwithstanding the fact that the olive has been cultivated for centuries for its oil, that its culture has not been placed on a sufficiently scientific basis to eliminate those considerations that are inimical to the more rapid expansion of the industry. It has been demonstrated, chiefly in comparatively recent years, that there is a very wide difference in the oil content of different varieties of olives, not only in quantity but in quality. When it is observed that this difference of recoverable oil in different kinds of olives may vary between 20 and 40 gallons per ton of fruit (in some cases the difference is even wider), it will be seen that the variation is often wider than the margin between profit and loss. Hence it is of primary importance, in selecting varieties where oil production is in view, that only those varieties with a high recoverable oil content be obtained.

Of course improved methods of culture, and favorable conditions, will always enhance the qualities and characteristics of the kind. In other words, the latent qualities of a variety will often lie partially dormant under a set of conditions radically different from the average by which its standard was appraised, but when those conditions are removed or modified, the qualities that have been lying quiescent reassert themselves, and may even be greatly augmented, but despite this the type remains unchanged.

The value of any variety will depend chiefly on:—

(1) Its recoverable oil content (quantity and quality);
(2) Its fruit bearing capacity and habit;
(3) Its constitution and immunity from disease;
(4) Its ability to thrive under the prevailing conditions.

It has been pointed out that it is useless for the producer to endeavour to compete successfully in the commercial field with varieties of low or crude oil qualities. Hence it is of first importance, at the outset, that the planter secure the most suitable varieties for his purpose. There is no more hope of a grower succeeding with some kinds of olives than there is with certain kinds of apples. The limitations of some kinds are such that, even under the most favorable conditions, with all the embellishments that the best of culture may give, they cannot be attended with a satisfactory degree of success.

When making a plantation of oil olives, *i.e.*, olives unsuitable for pickling, it must not be thought that any oil olives will do. That is not so, any variety will not do. They should not only be oil olives but they should be the best oil producers obtainable. In the case of olives, as with some of our other fruits, it would probably be a great advantage to the trade and prospective planters if many varieties were deleted from those listed. The confusion resulting from the continual addition of new kinds with their catalogued descriptions often tends to a lot of indiscriminate planting. No calamity is greater to the grower than to find that, when his trees begin to bear, his varieties are unsuitable, either lacking in oil content, sickly constituted, or shy bearers. And when he should be beginning to reap the rewards of several years of work he has to turn to and practically begin afresh. This has been the experience of a number of growers of other fruits in this State in the past. However, it is to be hoped that it will not be the experience of future olive planters. It is hopeful to know that of late years many of the unhappy mistakes of promiscuous planting have been obviated by the orchard supervisors and by a larger distribution of agricultural information through the press.

It is intended here to bring under notice the great majority, if not all those varieties listed by nurserymen in Australia in their catalogues, and those that were originally introduced into the early plantations. Consideration will then be given to a number of European, American and African varieties that appear to possess desirable qualities. It is very probable that there are many varieties growing adjacent to the shores of the Mediterranean that we have no record of. However, there are sufficient varieties known and enumerated here for all purposes, as far as numbers are concerned the difficulty is always one of elimination. A great number of kinds are recorded in different works that are not mentioned here; many of these with those given below have several synonyms in different countries where found growing in different provinces. It is believed, however, that among those listed in the following pages are the best kinds known to European and American cultivation. The description adopted for identification in the case of those not yet fruiting here are taken from the best sources available. But on the whole the nomenclature of olive varieties appears to be in a very unsatisfactory state, and a good deal of confusion is bound to exist until the whole ground is sifted by a Pomological Committee with International Associations.

When on a tour in Europe, in connexion with the viticultural interests of this State, Mr. F. de Castella also obtained a quantity of interesting and valuable data connected with the olive. In connexion with this

matter of varieties I am much indebted to him for a number of notes on Spanish, French, and Italian varieties which will appear in the following pages; also for further information respecting a number of the kinds, with their synonyms, in cultivation here. The notes referred to are mostly extracts from the works of some of the best known European writers* on the subject. He also informs me that the leading Madrid and Seville nurserymen catalogue only the following kinds as being the best for planting, viz., Gordal, Manzanillo, Sevillano, and Herbequina; while another well-known nurseryman of Barcelona stocks only Bacaruda, Grosal (probably same as Gordal), Herbequina, Olesana, Sevillano and Verdiello. These lists were in force in 1907-8. In regard to the Herbequina, or Arbequina variety which Mr. de Castella introduced here, he informs me that it is not mentioned in Professor Degrully's work on the Olive, and does not appear to be known in France, although strongly recommended as a good cropper and high oil yielder in Spain, especially in Cataluna. It has been fruited for the first time this season at the Dookie Agricultural College. A sample was forwarded to the Director of Agriculture, and tested by Mr. Scott, Chemist for Agriculture, for oil content. The return obtained for the whole fruit was 24.80 per cent. of oil. This is a satisfactory test, and it appears at present as if this will be a useful variety for planting. A further note regarding this variety will be found among those other varieties more recently introduced to this country.

The following varieties have been introduced into Australia, and will be found growing in one or the other of the different States. They are not mentioned in order of preference, nor can the first name given in every case be fully accepted as the correct one, as in some cases one or another of the synonyms given may have greater claims. The names given, however, are those under which the different kinds were introduced into this country. The first four mentioned were introduced into Australia by the South Australian Company in 1844. The next ten given were the original kinds introduced to the Dookie Agricultural College from the south of France. A number of these are given the names of species, but they are all, with possibly two exceptions (lauridolia and buxifolia), only varieties. This error in respect to a number of olive names was due in part to an old writer on the subject adopting specific names for varieties, and many of them have been continued up till the present, and are likely to be retained until the whole question has been sifted by an International Pomological Committee.

Verdale.—Syn., Verdaou, Aventurier, Calassen, Vardago, Verdal, Verdalega, &c. Rather dwarf grower, fruit nearly round, early, remains green until nearly ripe, then turns black, rots easily. Regarded as rather poor, erratic bearer. Oil variable in different soils, of a bland or fatty nature, does not keep well. Makes a fair pickle. This kind appears to be much esteemed by South Australian growers, but is not deemed of much value in France. There is possibly some mistake in the name.

Bouquettier.—Fruit medium to small, a good bearer, ripens fairly regularly; some confusion appears to exist regarding this variety. Some South Australian growers claim that it is a high oil yielder,

*Professor Degrully, Jose de Hidalgo Tablada, Professor Antino Aloi, J. de Guillen-Garcia.

while tests in New South Wales point to the contrary. It is not recognised as a great oil producer in other countries.

Fig. 25.—Promising Seedling Olives, Dookie Agricultural College.

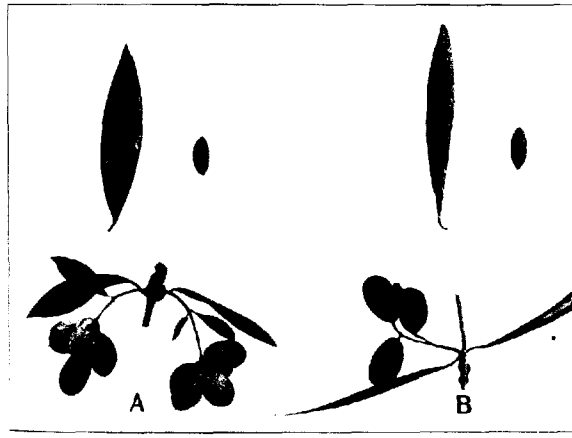


Fig. 26.—A. Olea Uvaria. B. Olea Polymorpha.

Salouen.—Probably from Salonenque, which is known chiefly as Corniale, (Syn., Pendoulier, Courneau, Couchesale) also said to be identical with Cornicabra or Picudo, and resembling Acebuche, which is

widely employed in Spain as a stock. Vigorous growing large trees of weeping habit, robust constitution, long lived, and good for shelter purposes. Good bearer, fruit good size, oval, makes a good quality oil, but does not produce in such abundance as some others. A small variety similar in respects to this kind is known as Petite Corniale.

Blanquette.—Syn., Blancale, Veral blanco, Blankette. Tree weak grower, rather erratic and straggling bearer. Fruit of good size, reddish-black, with small pit; unsuitable for commercial pickling; makes oil of medium quality, but only in poor quantities.

As far as can be ascertained by the writer there seems to be a good deal of uncertainty regarding the identity of the fifth variety originally introduced into South Australia.

Rubra.—Syn., Rubra caillon. Probably identical with Caillet, Caye, Cailletier, Cayou, &c. Large, long-lived tree of drooping habit, comes

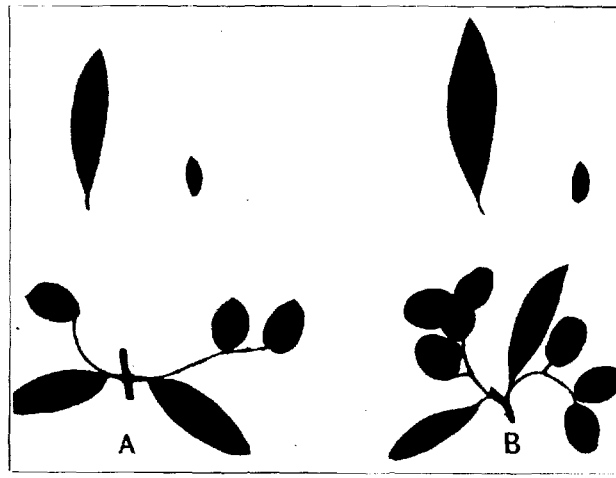


Fig. 27.—A. Olea Papillata. B. Olea Rubra.

into bearing early; is fairly good bearer, and produces a good quality oil but only in low to medium quantities; unsuitable for pickles. (Fig. 27.)

Papillata.—Tree of medium size, with straight branches; its leaves are short, broad, and far apart, being dark-green above and whitish underneath, a free bloomer but not a heavy cropper. The fruit is black, roundish oval, ending with a small topnot; strongly adhesive to pedicels, which are long. The oil is sweet and good, but only produced in small quantities; unsuitable for pickles. (Fig. 27.)

Laurifolia.—Fairly strong growing tree with very distinctive foliage. Large, broad, oval, lanceolar, dark-green, leaves borne on strong petioles. Blossoms borne in bunches. The fruit is roundish oval ending with a short blunt point, the skin is hard, dark, and the stone of medium size.

The oil is sweet and bland, but not abundant. Unsuitable for pickles. Only very moderate bearer.

Oblonga.—A good grower and cropper. The fruit is of oblong shape, narrow at the base and fuller towards the apex, giving a somewhat club-like appearance. The fruit is of good size with fairly large stone pointed at each end, and is borne on long pedicels to which they hang well. Its pulp is thin and oil bland and limpid. Of little value for oil or pickles. (Fig. 28.)

Conditiva.—Tree fairly good grower, with somewhat drooping foliage. The leaves are very long, close banded, and often curved. A profuse bloomer but poor cropper. The blooms often sterile. The fruit is large, oval, elongated, fleshy, with free stone, beautifully black when ripe, leaving its pedicel easily. The pulp is thick, tender, containing a sweetish oil in fair quantities for a pickling olive. This olive makes a splendid pickle, especially ripe, but owing to its shy

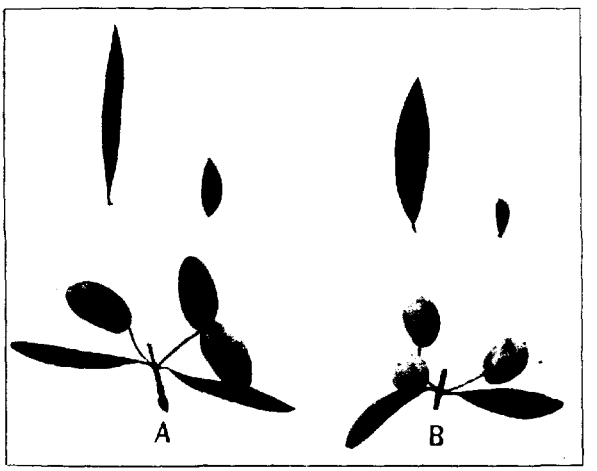


Fig. 28.—A. Olea Conditiva. B. Olea Oblonga.

bearing habits would probably not be a good commercial proposition: may do better with irrigation. (Fig. 28.)

Regalis.—Tree rather poor grower, fairly regular but light cropper, liable to scale. Fruit large, oval, generally borne singly at terminals or towards the base of last season's growth; deep bluish-black when fully ripe, changes quickly in colour. Unsuitable for oil, but makes an attractive green pickle but coarse in quality. (Fig. 29.)

Uvaria.—A good grower and free cropper. The fruit is of medium size, oblong oval, gets black when fully ripe, borne in bunches or clusters, as many as ten to fifteen fruits often being formed in a bunch. Ripens evenly and hangs well. Not a heavy oil yielder or high class pickler. (Fig. 26.)

Polymorpha.—Strong grower, of robust constitution, with distinct weeping habit. Moderate bearer tending to crop in alternate years. The fruit is oblong and very variable in size and colour. Generally of medium size, but running to large when the trees are in great vigor. The color of the fruit when ripe varies on some trees from green to violet-black, ripens rather irregularly. Oil good in quality, somewhat acrid in its youth, but keeping well, only produced in small quantities. Unsuitable for growing as a pickler owing to variability in size. (Fig. 26.)

Nigerrima.—Appears to be a hardy, vigorous growing tree. Fruit ripens early, medium size, oblong, deep black when ripe; pulp is very black and bitter; makes a good oil that keeps well. Low in oil content and unsuitable for pickles; not recommended. (Fig. 29.)

Atro-violacea.—Fairly large and vigorous tree. The leaves are of a pale-green, small, elliptical, sharp, far apart and strong. The fruit is

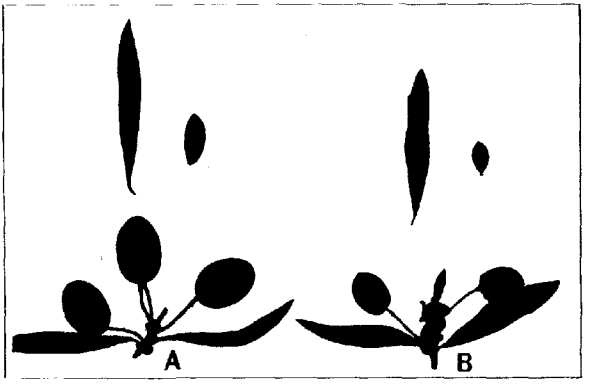


Fig. 29.—A. Olea Regalis. B. Olea Nigerrima.

borne on long pedunc1es, barely medium size, roundish oval, bluish-black when ripe. Makes fairly good oil, but not in large enough quantities to warrant planting; also unsuitable for pickling.

Buxifolia.—The box-leaved olive; an unimproved kind of no commercial value for oil or pickles. Like Laurifolia, believed to be a subspecies of O. Europaea, suitable for small hedges.

Further consideration of the various kinds in cultivation here has been held over for subsequent issue. The next number will not only contain notes respecting a lot of inferior kinds, but will embrace a selection of the best kinds known to cultivation in Europe, America, and this country.

(To be continued.)

THE CARE OF MILK AND CREAM.

By Alexander Mess, Dairy Supervisor.

The question of unclean milk and cream has probably been discussed more frequently than any other subject affecting the dairying industry, not only in this State, but in every other country in the world.

Unfortunately, under the present system, cream is being accepted at butter factories and paid for at the same price irrespective of its class or quality, with the exception of the very worst lots, which are rejected. When all grades are mixed together it has the effect of reducing the whole lot to an inferior standard of quality, so that it is impossible in the manufactured article to get the full benefit of the best supplies brought to the factory; and farmers who take special care of their cream do not reap the benefit of the care they take, but have to share equally the loss brought about by their less careful neighbours.

With regard to milk, very often sediment will be found in the bottom of the milk jug. This is an indication of gross carelessness somewhere between the cow and the consumer. Freedom from visible dirt does not mean that milk is necessarily clean, but the presence of sediment means that not only was dirt allowed to fall into the milk, but not sufficient care was taken to strain it out.

The most essential things in insuring a clean milk and cream supply are fortunately simple precautions, which do not in the long run add to the cost of production in any appreciable degree. I should say these may be pretty well covered by the following:—

A clean cow-shed, with an impervious floor and a good drain to carry the drainage well away, well lighted and ventilated, and frequently limewashed. The cows' udders should be cleansed before milking, and the milker's hands washed before milking each cow, in clean water; the same water should not be used over and over again, and contained in a small fish-tin, as is sometimes observed. If the same water is used right throughout in a herd of forty cows, more dirt may be added to the cows' udders before the last cows are milked than would appear to be washed off. The best way is to use running water from a tap fixed in a kerosene tin, oil drum, or an unused milk vat of a separator set up in a convenient place in the shed. By this means the water is only used once, and you get a clean supply every time. No person should smoke, chew tobacco, or spit while engaged in the cowshed or dairy. Cream should be kept cool, well stirred, and covered from dust and flies, and not mixed with other cream until it is cooled down. The separator should be taken to pieces and washed every time it is used, any holes in the dairy utensils should be soldered, and not filled with soap or rags. Do not put cream or milk into rusty cans. Cans should be re-tinned or new bottoms put in them if they are worth it; if not, they should be discarded. If cream is kept in rusty cans it develops a metallic flavour; it may take up iron from exposed bolt heads or other metal parts of pasteurizers or rusty cream vats, in sufficient quantities to affect the flavour of the butter. The manufacture of good butter rests mainly with the suppliers, and they should do everything possible to deliver their cream in a good

and wholesome condition. Milk drawn by milking machines often has a peculiar flavour and contains a large number of undesirable germs. One of the important sources of germ content in milk drawn by machines is the condition of the rubber tubes and teat cups. The trouble from this source can be lessened; when the rubber begins to crack, new parts should be secured. Old overheated and cracked rubber is sticky, and when in use the rubber spreads and allows the milk to enter the openings; these crevices are difficult to clean properly, and are a dangerous source of infection. Another source of infection is the constant suction of the cowshed air in badly ventilated sheds through the pulsators into the buckets; this difficulty may be partially overcome, providing that the air is kept free from dust as far as possible.

Occasionally tests will vary at the factory. Suppliers should not decide they are being defrauded in any way when their test varies. Some reasons for variation in tests are changes in the speed of separator bowl, changes in the temperature of the milk, changes in lactation period of the cow.

BARLEY TESTS.

EXPERIMENTAL PLOTS AT WORTHAM.

A meeting of farmers was held on Wednesday morning under the auspices of the East Suffolk Education Committee to inspect a barley variety experiment which is being conducted on the farm of Mr. H. L. Newstead, of New Water, Wortham. Mr. A. W. Oldershaw, agricultural organizer to the Committee, demonstrated the points of interest.

He pointed out that last year barley variety tests were carried out at four centres in the county, and that on the average of these centres Beavers Plumage-Archer had given barley valued at £8 19s. 6d. per acre; Hunter's Archer, £8 18s. 4d.; Princess, £8 16s. 10d.; Goldthorpe, £8 16s. 3d.; Beaver's Archer, £8 13s 7d.; and Page's Chevallier, £7 13s. The outstanding feature of the experiments was the fact that Chevallier gave about £1 per acre less money value than any of the other varieties tested. The difference between the other varieties in money value per acre was not great.

At Mr. Newstead's the following varieties were being tested:—Irish Archer, Princess, Beaver's Archer, Beaver's Plumage-Archer, Irish Goldthorpe, Webb's Burton Malting, Chilian Chevallier, and Kinver Chevallier.

Of these varieties the first four were those included in the test last year, the first three being pure strains of Archer from different sources. Beaver's Plumage-Archer was a cross between Plumage, a wide-eared barley of the Goldthorpe type, and Archer. Burton Malting was a wide-eared barley brought out by Webb's. It was somewhat similar to Goldthorpe, but rather earlier. It was very much grown in the Midlands, but not much in the eastern counties. Chilian Chevallier had been grown successfully near Ipswich for the last year or two, hence it had been thought desirable to include it in the test, while Kinver Chevallier might be regarded as a typical pure Chevallier.—[*Journal of Milling*, 5th August, 1914.]

THE PEANUT.

(*Arachis hypogeœ, Linn.*)

By P. J. Carmody, Chief Orchard Supervisor.

Since the few instances in which the peanut, or ground nut, has been tried in Victoria have satisfactorily demonstrated that it can be successfully produced, keen interest in its potentialities as a commercial proposition has been evoked amongst the irrigators of small holdings in the northern part of the State.

With the view of familiarizing prospective farmers of this crop to its habits and characteristics this article is written.

The peanut is an annual herbaceous plant growing from 1 to 3 feet in height, according to the variety, and to the fertility of the soil in which it is cultivated. In general appearance it resembles clover, but four leaflets occur in each leaf instead of three, as is the case with clover.

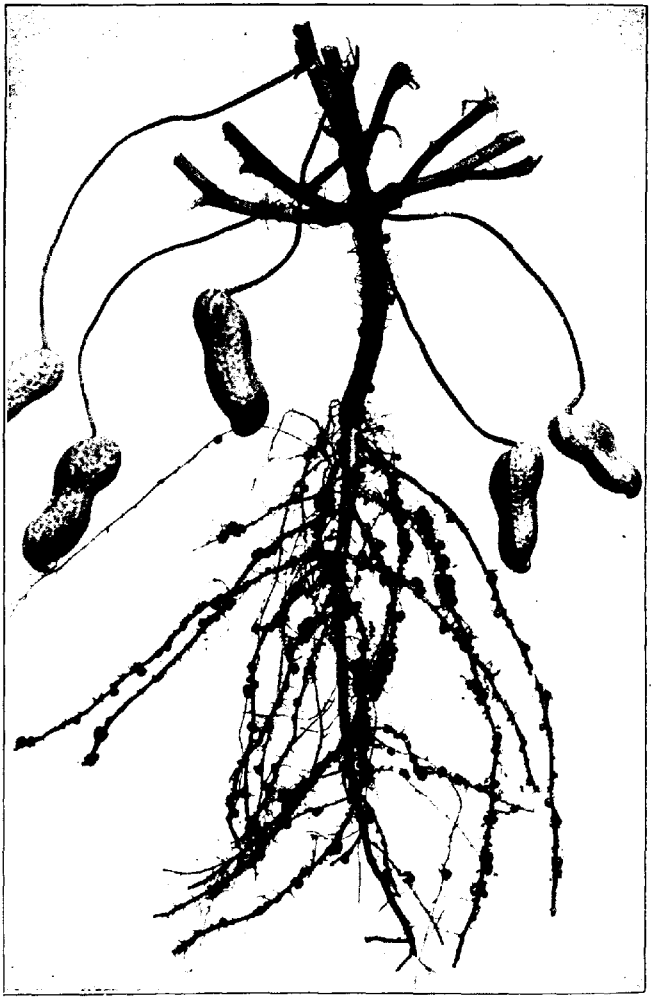
The flowers are bright yellow and are of two kinds, male (staminate) flowers, and female (pistillate) flowers more or less hidden in the axils. The more conspicuous male flowers are sterile and soon die. The female flowers when first produced are sessile, but after fertilization has taken place the peduncle is developed, and curving downwards penetrates the soil and buries the fertilized ovary beneath where it develops its seed, and the familiar peanut of commerce is formed. If the stalk fails to penetrate the soil no seeds are produced, so that in soil destined for the cultivation of the peanut a fine tilth is necessary to enable the delicate flower stalk to penetrate it.

The peanut is believed to have originated in Brazil, where several other closely allied species are found. It has now a very wide field of cultivation in tropical, sub-tropical, and temperate regions. Climates favorable to the production of citrus fruits and maize are considered suitable to the peanut. So popular and important has this nut become that in many countries thousands of acres are devoted to its cultivation. Virginia and the Carolinas produce the largest quantities in America, but it is extensively grown in many of the other States. It is also largely grown in Africa, Brazil, Argentine, India, Japan, and Java. Spain and Sicily are the great nut producing countries of Europe. In Northern Australia good crops of this ground-nut have been harvested, and there is no reason why, when our irrigation farmers become familiar with its cultivation, it should not enter into our system of rotating crops.

VARIETIES.

There are only a few varieties of peanuts in general cultivation. By the selection of good, sound seed from vigorous and heavily yielding plants, farmers interested in this particular phase of agriculture will be able to supply themselves with seed suitable to their climate and soil.

The Spanish peanut is regarded as one of the heaviest producers. The plant is of the bunch type and somewhat upright in habit, bearing



Roots of Peanut Vine, showing the value of this plant as a nitrogen gatherer. The nodules on the roots are formed by the bacteria which collect the nitrogen.

its pods clustered around the base. The foliage is heavy and abundant. Two seeds occur in each pod and are very rich in oil content. Pods stick well to plant when digging.

The Virginia nuts vary from a moderate to an immense size. The vine has two habits—a trailing and a compact upright one. In the former the pods are produced along the stem, while in the latter they are formed near the base. The pods of this variety are bright and clean and cling well to the stem during harvest operations.

African or North Carolina is a rank grower, with dark green massive foliage, and is grown for oil in Africa. It has the habit of the Virginia trailer.

Tennesse Red resembles the Spanish, but owing to its colour is grown chiefly for fodder.

Valencia is similar in many respects to Tennessee Red, but of much better quality and takes about four months to mature.

SOILS.

From the fact that the plant buries its pods in order to develop them, it is evident that the soil must be in a suitable condition for their reception. Consequently sandy loams are regarded as best adapted to the cultivation of the peanut. If it is intended to offer the nuts on the market for edible purposes, a soil of a light colour is to be preferred, as there is a considerable risk to the discoloration of the fruit if grown in dark soil impregnated with iron.

Under careful management goods crops have been produced in the heavier soils, but they were reserved for stock, owing to the unattractive appearance of the nuts.

The sandy pine ridges that frequently occur in the irrigated areas of the north offer splendid accommodation for a crop of this kind. Care should be taken, however, to avoid those soils that set after irrigation. In the young orchards, advantage could be taken of utilizing the spare ground between the rows of trees to grow peanuts where the soil is of the character indicated above. Owing to the presence of nitrifying bacteria on the roots, nitrogen is added to the soil by the peanut, as in the case of peas, tares, and other leguminous plants.

PREPARATION.

The land should be ploughed moderately deep, from 7 inches to 8 inches, and reduced to a fine tilth. Ridges 3 feet apart from centre to centre are formed by two reverse furrows in the same way as the "crown" of the land is made in ordinary ploughing. By attaching a board to the back teeth of a Planet Jr. cultivator the ridges can be levelled down to the required height, about 3 inches. If the ground is weedy or covered with grass the ploughing should be done in the Autumn and left till Spring, when, by means of disc harrows and cultivators, it can be thoroughly worked up into a fine tilth preparatory to forming the ridges.

FERTILIZERS.

The amount of fertilizers to be used will, of course, depend on the natural fertility of the soil. If too large a quantity is used the plants will produce too much haulm and very little fruit. For the same reason

fresh stable manure is to be avoided. The peanut enjoys a soil rich in lime, and if this is deficient, from 5 to 10 cwt. of fresh burnt lime per acre should be applied in the Autumn, the heavier dressing in soil over-run with weeds. If the farmer considers fertilizers necessary, an application of 100 lbs. of superphosphates, 150 lbs. of dried blood, and about 50 lbs. of muriate of potash per acre would be found beneficial.

The practice adopted in countries where the peanut is grown is to distribute the fertilizers in the narrow strips where the rows of plants are to be sown and thoroughly mix with the soil before forming the ridges in which the seeds are sown.

PLANTING.

If the seeds are planted out whole, germination is delayed, as the shells or husks must decay before the young plants are allowed to escape. In such a climate as ours this takes a considerable time, so that it is better to plant out decorticated seeds.

The shells are carefully broken by hand so as not to injure the thin brown skin that coats the seeds. Injury to this part is liable to be followed by decay after planting. A great advantage in sowing the decorticated nuts is the opportunity that is offered for the elimination of all defective seeds, and selecting only the full plump ones, whereby a better "stand" is secured. The seeds should not be shelled until a short time before they are required to be used as their power of germination is likely to be weakened.

By means of an improvised harrow with teeth set at the required intervals, 36 inches, the drill for the seed can be marked out along the centres of the ridges already formed, and the seeds dropped in by hand at spaces of not more than 12 inches, at the same time covering them up with the feet. From 1 inch to 2 inches is the depth at which the seed is sown. In the heavier soil, about 1 inch is sufficient.

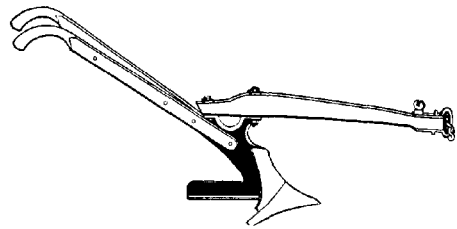
The time of planting varies with the climate. In temperate regions the peanut takes about six months to mature its crop. About the beginning of October, when all risks from frosts have disappeared, the nuts can be sown. This will give sufficient time for the maturing of the crop before the harvest in the autumn.

After the young plants have reached a height of a couple of inches the cultivator should be run up between the rows. Opportunity for irrigation is afforded by running the water along the depressions between the ridges. In order to conserve moisture and suppress weeds, it will be necessary to frequently use the cultivator, particularly after each irrigation. The surface must not be allowed to "set." It is important during cultivation not to injure or disturb the first-formed nuts near the base of the plants. Cultivation is unnecessary after the plants have made sufficient growth, and when this takes place the soil should be gathered well into the plants to offer facility for the fertilized ovaries to penetrate it.

HARVESTING.

As frosts are injurious to peanut vines in all stages of their growth, it will be necessary, if required for fodder, to begin harvest operations before their advent in Autumn. The time when the nuts should be dug must be left to the judgment and experience of the grower.

Generally, however, as soon as the crop of nuts is developed on the bush, and when the stems assume a yellow appearance, an ordinary plough, with the mouldboard removed, is run along the rows. By this means the plants are loosened, and are then gathered, the sand shaken out of them, and thrown into small heaps.



Plough Type of Peanut Digger.

If the area under cultivation is limited, the plants can be forked out and similarly treated. In countries where this industry is extensively carried on, special machinery is used for carrying out these operations.

Stakes Around which Stacks of Peanut Vines are to be Built.

After the vines are allowed to remain in the heaps for three or four hours, they are gathered in stacks around central stakes to cure. If they are exposed for an undue length, they lose in weight, and become more or less discoloured, and their market value greatly depreciated. As the haulms or stems of the vines are of a sappy nature, they take

a long time to cure, and are liable to mildew if stacked in large heaps where there is difficulty in properly drying them.

Small stacks or shocks are built around a stake 7 or 8 feet long set firmly in the ground. The stakes should be sharpened at both ends, and a couple of pieces of laths about 18 inches in length nailed at right angles to the stake, about 6 inches from the ground, to prevent the vines coming into contact with the wet soil. The stack is then built in successive layers with the nuts to the centre and the stems sloping outwards to shed water. At times, a few vines are hung round the stake to tie the stack together. When approaching the top, the stack is rapidly "drawn in" so as to form a cone capping.

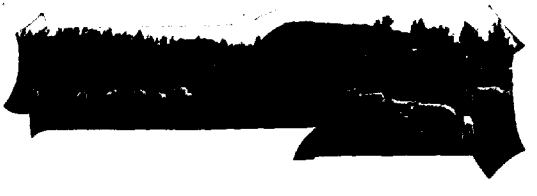
These stacks afford a large surface to the winds, so that the curing is effected more readily than in larger stacks.

Peanuts are picked from the vines when the pods become dry and the seeds firm. It usually requires three to four weeks in the stack before the pods are ready to be picked. Rapid curing causes the seeds to shrivel. From the time the plants are dug they should not be exposed, and the stacks should not be opened during heavy dews or rain, as the nuts are liable to discolouration.

The peanuts, if required for edible purposes, are picked from the vines by hand, though machinery is now largely used to do this work. After picking they should be kept in a well-ventilated building, and not allowed to come in contact with any dampness. In countries where this industry is extensive, the factory cleans, blanches, and grades the peanuts for market.

USES.

Peanuts have a wide range of utility. Every one is familiar with the edible nut, as offered for sale in the streets, shops, and many places of amusement. They are also extensively used in confectionery, in the manufacture of peanut butter, peanut meal, and peanut oil. The peanut oil is used for the same purposes as olive oil, though slightly inferior. The peanuts, when grown for fodder, are generally fed to pigs, which are turned in on the crops to root out the nuts for themselves after the tops have been cut for hay. A crop of 60 bushels of peanuts per acre is considered a good yield, and the price per bushel varies from 2s. 8d. to 3s. 4d. in America, so that the returns at these prices would be, apart from the hay, £8 to £10 per acre.



FORESTRY IN AUSTRALIA.*

A SKETCH.

By H. R. Mackay, Conservator of Forests, Victoria.

PART I.

Of all the great divisions of the globe, Australia has the smallest area of timber-forest in proportion to her total land surface. The figures on this subject given in most publications are very misleading, being merely rough estimates, which do not distinguish between true forest land, bearing timber of commercial value, and other large areas irregularly wooded or bearing dwarf eucalypts, and various forms of acacia, such as mulga, myall, &c., together with the stunted cypress pine and casuarinas of the interior. Some statistics give the forest area at over 100,000,000 acres, or about 5 per cent. of the total land surface, an excessive estimate when I point out to you that the forest area, as well as the forest wealth of each State, has never yet been based on trial surveys or fairly accurate data, and that the irregular course of settlement, with the widespread damage which occurs in all Australian forests from the regularly recurring summer fires, materially reduces the total acreage every year. After an examination of all available authorities, I have come to the conclusion that the true forest area is less than 4 per cent., or under one twenty-fifth, of the total land area. Further, the forests are almost entirely coastal, that is to say, the magnificent hardwoods, of which they chiefly consist, are confined to a great belt, with long irregular breaks at intervals, which extends from 100 to 150 miles in width, and which generally follows the coastal line. On the inland side of this narrow watershed and wooded belt, the forest growth rapidly deteriorates as you advance towards the centre, box of medium growth alternating with cypress pines and casuarinas, till at last, in the central depressions, clumps of stunted eucalypts exist, which are intermixed with acacias and other forms of scrub growth.†

It has taken the Americans some 250 years, reckoning from the period when the eastern States began to be fairly settled to bring their great forests of hardwood and pine to the verge of destruction. But Australians, with the experience of the world before them, have taken only about 70 years to bring their forests to the same condition of partial ruin. And the reason of this is plain. Australia has no great central range of mountains, with long water-ways draining their slopes and valleys, forming an extensive forested region such as the water-sheds of the Missouri and Mississippi, or the broad stretches of pine and spruce-clad country which surround the Great Lakes to the northward. Her central plains and plateaus are almost treeless, and thus, as population extends, there is no great wooded territory in reserve to meet the requirements of her people for timber supply. No steps were taken

* Address delivered at the Annual Conference of the Australian Natives' Association, 13th March, 1915.

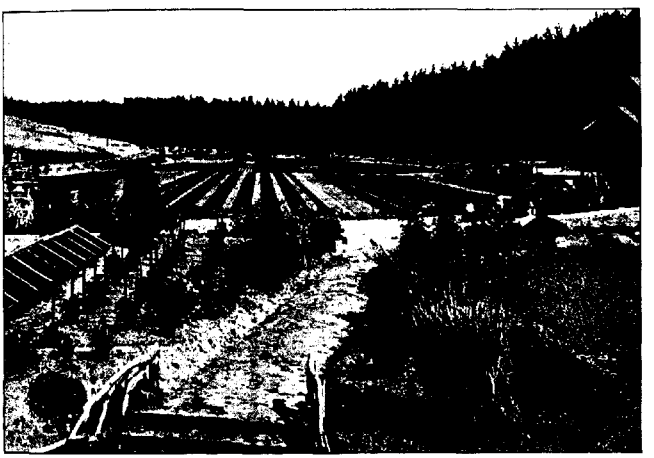
† The chief timber producing countries of the world have the following percentage of territory under forest:—Sweden, 52·2; Russia, 43; Germany, 25·9; Austria Hungary, 29·6; France, 15·6; United States, 33·6; Canada, 22·3.

in the early history of these States to delimit and set aside by law the best areas of natural forest, and, as settlement proceeded, once the fertile lands of the plains became occupied and gradually passed to private ownership, new settlers in search of land invaded the mountain ranges. It was in this way that the great Otway and Strezlecki forests of Victoria were virtually destroyed in the course of about 30 years, scarcely any timber growth of value being left even on the highest ridges and pinnacles, while on the broader plateaus, where the eucalypts grew to giant size, and the blackwood equalled in height and girth the common hardwoods of the lowlands, the same wide destruction prevailed. And now be it remembered, that the plea that this kind of land was fit and necessary for settlement could not be truthfully advanced in many instances. After high mountain forests and tablelands were thus occupied in small holdings and stripped of their cover, it was found that, owing to the heavy cost of clearing and the unfitness of the soil for cultivation, men could not support families on the land with comfort, but had to have recourse to timber-cutting or other work as wage-earners. Hence, it was found necessary later on to repurchase in the plains and river valleys land at substantial prices really fit for families to make homes on. This course of settlement, with temporary clearings in the heart of thick forest, has been more marked in Victoria, perhaps, than elsewhere, and in many districts of high elevation one

View of State Nurseries, Creswick, Victoria.

now witnesses the temporary clearings abandoned by the original settlers being gradually invaded by a new forest growth, the selectors having departed to make a start elsewhere on lands which give more prospect of success.

Let us now take the several States in order, glancing briefly at their forest reserves and resources. Queensland, whose main forest area, much over-estimated at 40,000,000 acres, lies between the coast range and the ocean, has under 3,750,000 acres set aside for timber supply, but no portion of this is inalienable by law. Her hardwood timbers, consisting chiefly of ironbark, tallow wood, spotted gum, blackbutt, bloodwood, and turpentine, are of great value, but limited in extent. To these we may add first-class timbers for the cabinetmaker, such as cedar, silkyoak, maple, blackbean, yellowwood, and, in a less degree, kauri, hoop, and bunya pine, which, owing to the inroads of settlement,



Another View of Creswick Nurseries.

have greatly dwindled in quantity. It is admitted in the latest available report that the forest reserves of this State are not under safe tenure, that much waste occurs in the extraction of timber, and that but little has yet been effected to put the forests on a safe working basis, in order to insure a regular timber supply. Meanwhile, large quantities are being cut by mills for the home market, and for export, and unless public opinion supports the management and gives greater powers of control to insure proper working, it is plain that the capital value of the extensive supplies still to be drawn upon will be very much impaired. The revenue received by this State in 1912 from sales of timber was £53,000. Under £3,000 in the same year was expended on a forestry staff, and the bulk of the work was done by agents and rangers of the Lands Department. Nothing was spent on forest improvement work or new plantations.

New South Wales, with a forest area estimated at some 15,000,000 acres, about 7,500,000 acres of which are provisionally reserved, originally possessed in her coastal forests some of the most valuable hardwoods of the Continent, the species being similar to those just mentioned as growing in Queensland, with other kinds which are common to Monaro and Eastern Victoria. The spread of settlement between the coast range and the ocean, however, has greatly depleted her areas of good natural forest. Tallowwood, for instance, has become exceedingly scarce, and the best supplies of mature ironbark have gradually disappeared, till in some districts the State railways have to take secondary and inferior timbers for bridge-work and sleepers, whilst an embargo has been placed on the export of this matchless hardwood. On the northern rivers, silky oak and cedar have virtually disappeared

Packing Young Trees at Creswick Nurseries for Despatch to Various State Plantations.

from extensive areas, and the supplies of Moreton-bay or hoop pine—a very useful softwood for the cabinetmaker and joiner—are also much depleted, being confined to coastal areas near the Queensland border. The State has still fair supplies of redgum along the course of the Murray, but, owing to its situation, this fine timber chiefly finds a market in Victoria, being too distant from Sydney for transport by rail. In 1912, New South Wales exported timber, chiefly railway sleepers, beams and bridge and jetty material to the value of £280,000, while she imported timber, chiefly pine and spruce, to the value of £1,147,0[illegible] These figures, I understand, include considerable supplies for the silver mines of Broken Hill, where oregon is largely employed. Her Forests Department has just begun to establish plantations of softwood, and, in view of the position just stated, heavy and costly work lies ahead of

it, not only in this direction, but in the improvement and restocking of the great hardwood forests. The revenue of New South Wales from sales of timber, in 1912, was over £95,000. Of the expenditure (£34,000) in the same year, nearly £30,000 was spent in salaries and wages, and only £3,900 on improvement work and plantations.

Victoria, being the centre of the mountain system, is, in proportion to her small territory, one of the best wooded of all the States, but

Forest Scene, Rubicon Reserve, Alexandra District (Blackbutt and Mountain Gum).

her area of timber-forest is much lower than the figures commonly given, namely, 11,800,000 acres. It may now be accepted that the true area is less than 7,000,000 acres, and a proportion of this at high elevations has been greatly damaged by fire. As we cannot safely encourage an export trade in the more durable hardwoods, such as redgum, box, and ironbark, the moderate supplies of these timbers still available are reserved for the requirements of our railways and public works generally,

but it is significant that the price of railway sleepers of these timbers is somewhat lower in Melbourne than in Sydney, while the cost of the less durable jarrah supplied from Western Australian forests to South Australia is considerably higher at Adelaide. As regards timbers fit for building construction, coach-building work, and plain furniture, we have still large supplies untouched standing in virgin forest. These areas require only protection from fire and careful working and management to reproduce themselves indefinitely. Such timbers, when seasoned for flooring, plain cabinet-work, and joinery, will, I consider, be available shortly for sale in large quantities, as private firms, being satisfied of their fitness for the purpose, are about to take up the industry on an extensive scale. As regards plantations of pine and fir, the areas devoted to this purpose are being extended every year, and will soon reach 20,000 acres, but such an area is not a tenth part of what should be maintained by Victoria under pine-forest for our own needs, seeing that we purchase from foreign countries timber of the kind to the value of about three-quarters of a million sterling. The revenue from the Victorian forests is, roughly, £50,000 a year. Of this sum, about £15,000 a year only is expended in new plantations and forest improvement.

Tasmania has over 65 per cent. of her territory, or, in other words, about 11,000,000 acres, under forest. Much of it consists of excellent hardwoods similar to those of Victoria, namely, stringybark or messmate, bluegum, mountain ash, silvertop, and cidergum. In addition, she has limited supplies of fine coniferous or softwood timber, such as huon pine, celerytop, and King William pine. Lastly, she has fairly extensive belts of blackwood—one of the finest furniture or cabinet timbers which the world possesess. Her reserves, the tenure of which is merely nominal, are set down at 1,000,000 acres, but, owing to her small population and her large proportion of forest land, it is plain that some of the Australian States on the mainland will have to draw upon her for supplies as their own resources become reduced. At present she has no system of forest conservation or control, but a Committee has lately been appointed to frame a Bill for the reservation and protection of the forests as a first step to stricter methods of working.

South Australia has a very small area of natural forest, which is situated chiefly in the south-east part of the State, close to Adelaide and Spencer Gulf. Her total wooded area is set down at something under 4,000,000 acres, but most of this does not represent timber-forest. Her reserves embrace less than 147,000 acres. Her treeless condition made early planting a public necessity. She has pursued the establishment of plantations of hardwood and pine with great energy for over twenty years, and to-day the Government has within its enclosures some 16,000 acres, chiefly of eucalypts and pine. A fair proportion of the timber growing in these plantations is now approaching a size at which it can be put to commercial use.

Western Australia, with a forest area bearing all kinds of timber, roughly estimated at 20,000,000 acres, very little of which is, however, protected by permanent reservation, is to-day subject to the most extensive timber-cutting operations of any of the States of this group. Last year she exported timber to the value of nearly a million sterling (6,000 men being at work as timber-cutters in the forests), for which the

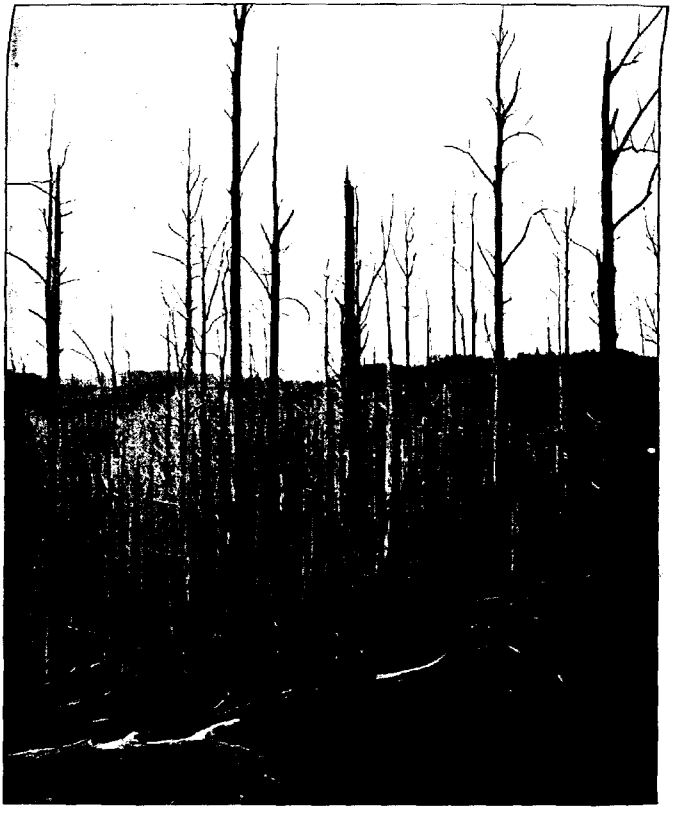
Government received a nominal revenue of less than £45,000. Practically nothing was spent in the improvement of the young coastal forests, and nothing in preparing cut-over areas generally for safe natural reproduction. The Government expended in salaries and wages £10,470, and then apparently left the maintenance of the forest to chance or the next generation. From a table published with the last Perth report, I find that the State has derived from the forests (the fees and royalties for a long period being merely nominal), during the eighteen years from 1895 to 1912, no less than £380,000. Here, again, is a State which chooses to neglect the elements of conservation and management in order to maintain a large export trade in timber, which some local authorities aver cannot last beyond twelve to fifteen years.

In concluding this rapid sketch of Australian forests, a dispassionate survey of their present condition generally must lead us to the opinion

Forest Scene, Orbost District, East Gippsland.

that all the States have for many years past neglected the simple elements of proper management and control, and that, when not engaged in wastefully alienating tracts of valuable hardwood, which should remain national property for all time, they have been busy in overtaxing the safe timber yield of their reserves in order to foster an extravagantly wasteful export trade. This trade is encouraged at times even at the expense of the States' own public and private requirements, while the measures taken, and the public funds devoted to the preservation and improvement of the most valuable forests of the country, are absurdly inadequate to the purpose. It follows, also, that while Australia imports annually enormous quantities of softwood for building construction, and while nearly every State has extensive areas of waste land, the soil and climatic conditions of which are admirably suited to the growth of spruce and pine, they have nothing but a few puny

plantations of such trees to set in the balance against the waste of three generations. Apparently, for some years to come, Australia will be content to deal with small measures, such as the elaboration of all that relates to the franchise and the voting machine, and will continue to neglect the duty of protecting and developing her great natural forests, on whose existence depends the prosperity of so many useful industries.



Denuded Areas, Strezlecki Range, South Gippsland. This shows destruction of timber.

PART II.

I now come to the second part of my subject—the mountain watersheds of Victoria:—

With the exception of the Grampians, Mt. Cole, Wombat Ranges, the Upper Yarra Ranges, with part of Baw Baw, Mt. Buller Range, and

a portion of the Omeo Ranges, but little of the mountain chain of Victoria, which forms the Main Divide, is reserved under any form of tenure, and thus protected from alienation, or from the dangerous and insidious form of occupation which arises from grazing licences, with indiscriminate firing during the hottest season of the year. Virtually, the whole of these unreserved mountain ranges, embracing within their limits several hundred thousand acres, bear forests of great value considered merely as a source of future timber supply, but considered in their climatic aspect as the storehouses of our heaviest snowfall and rainfall, as the sources of springs, and the regulators of our stream flow, their value to the people of this country is priceless. Viewed as timber forests alone, they bear enormous quantities of ash, woollybutt, bluegum, spottedgum, stringybark, messmate, silvertop, and peppermint, ranging in value from £50 to over £100 an acre, but above a certain line of elevation, they must always be strictly protected from the axe of the timber-getter, as well as from the ravages of fire.

Settler's Home, showing lack of shelter for homestead.

Therefore, if they are not to be allowed to disappear during this generation, they must be put under the strictest form of reservation we possess, that is, under forest law, and further be patrolled and guarded during the dangerous season of hot winds by an active body of guards, who will check and prevent the incendiary fires which now threaten their very existence every summer. At present the Forests Department is able to spend about £500 a year only in forest fire protection, but fully six times this sum is essential to safeguard the principal mountain forests from deliberate fire-raising. It must be remembered that, not only are our young forests of evergreens very inflammable in summer, owing to the essential oil in their foliage, but that many of them bear a dry fibrous coating of bark which carries fire to the summit of the loftiest stems, while the underwood and scrub, after a few hours of hot winds, is in a condition to carry forward volumes of flame of a fierceness and intensity which cannot be successfully coped with by even

a large body of fireguards. An army of beaters is helpless in thick forest with heavy undergrowth, when such fires have made headway with a raging wind on a wild January day, for not only the main fire cannot be approached, but strips of flaming bark are carried ahead long distances, lighting up new walls of fire, perhaps nearly half-a-mile from the break or track where the beaters are at work. Therefore, the first essential for the safety of such forests is to prevent, as far as possible, the outbreak of any dangerous fires.

A short time ago I had occasion to examine the high country which forms the Divide between the head waters of the Goulburn and Mitchell on the south, and the King, Buffalo, Buckland, and Ovens Rivers on the north. For several days we travelled along high, narrow ridges which had originally been clothed with thick belts of woollybutt and

Farmer's Wood Lot, showing provision for fencing and fuel, Western Plains, Skipton.

ash. Now, the timber on whole ridges and spurs was completely destroyed. Gaunt bleached skeletons of dead trees stretched as far as the eye could reach, falling southward toward Gippsland, and northward towards the Murray. Where patches of deep granite soil existed in folds of the tableland, and belts of young seedlings had given promise of a new forest, a second fire had swept over portions of the range and had destroyed them. In many places, useless scrub acacias, and patches of high bracken in the upper valleys, had taken the place of young tree-growth. On the bare slopes, where, in spring, soakages existed, the shallow peaty soil had been burnt away, exposing many acres of naked rock, while, in the steeper valleys, erosion from the winter rains and the snow water of spring had set in, the narrow water-courses gradually widening into a gulch or ravine whose course could be traced

into the lower valleys far below. What I witnessed in those fire-swept areas, I have seen in many other parts of the Australian Alps and again in Central and Southern Gippsland, as well as in the soft grey sandstone of Otway, and the Strezlecki Range. Probably, there are few places in Australia where the neglect and utter disregard of the protective influence of mountain forests is so marked as in Eastern Victoria. Everything appears to be sacrificed to indiscriminate selection, or private grazing rights, and where the occupier cannot hope to ringbark a grazing block in mountain country, he attains his aim in a speedier way by the use of match and fire-stick. How long, we may well ask, is this callous indifference to the safety of our timber supply, our water supply, and the soil of our mountain slopes and valleys to last? For the sake of a few hundred pounds, paid yearly for the right to enjoy unrestricted summer grazing, we are imperilling the existence of many of our best forests, impoverishing the soil of extensive areas of hill and valley, and gradually bringing about the silting up of perennial streams and river beds.

Worst of all, in a land subject to periodical droughts, we are endangering, in many instances, the regularity and volume of our stream flow. The State has spent several millions sterling on storage works and irrigation basins on the plains. On the continued storage capacity of these basins and reservoirs generally, the prosperity of our richest orchard and farm lands depends. Are we prepared to knowingly sacrifice the prosperity of great stretches of our northern plains to the temporary interests of a few score stock-owners, who should be excluded altogether from country which apparently they cannot occupy without bringing about its gradual ruin?

TEMPERATURES FOR MATURING CHEDDAR CHEESE.

By R. T. Archer, Senior Dairy Inspector.

The temperature at which the cheese maturing room is maintained is of the greatest importance, as the flavour developed is largely dependent thereon. Greater provision is required in most of our factories for the control of the temperature, as frequently good cheese is ruined in flavour by being subjected to too high temperature. In addition, there is loss of weight from excessive evaporation of moisture and loss of fat.

The cheese industry in this country is only in process of development, and the system now almost universally adopted is a Canadian modification of the old English Cheddar process. The Canadians have given the subject great study, and most nearly approached the best English makes in quality. One thing that has aided materially in this direction is the greater attention paid to the temperature at which the cheese is matured. The man most responsible for this is Mr. J. A. Ruddick, Dairy and Cold Storage Commissioner of Canada. It was

found that the maturing rooms in England where the best cheese was made never went above 65 degrees Fahrenheit, and the best quality of Canadian was always produced during the months of September, and possibly October, simply because climatic conditions at that time of the year give better maturing temperatures than at any other season. After careful investigation it was decided that 60 degrees was the temprature which gave the best results, and it was decided to demonstrate this on a commercial scale. In the spring of 1902 the Dairy Commissioner was authorized by the Government to build four large central cool curing rooms at convenient centres, to which the cheese from some forty factories could be conveniently conveyed every day. These establishments were operated for five seasons, handling in all 190,087 boxes of 80-lb. cheese. Two cheeses from each factory's make were set aside every week for the purpose of testing the savings in shrinkage and the effect of cool curing on the quality. These two cheeses were always selected from the same batch; one of each pair was kept in the cool room, and the other was kept in a room where the temperature was uncontrolled. Over 3,000 pairs were tested in this way, and they were all carefully examined and compared until they were several months old.

The results of this extensive demonstration is summarized as follows:—

1. Cool cured cheeses are invariably better in texture and flavour than cheeses from the same batch cured at ordinary summer temperatures.
2. The saving of shrinkage amounts to about 1½ per cent. during the first two weeks. It varies according to the moisture in the cheese.
3. The surfaces of the cheese should be allowed to dry thoroughly before the cheeses are placed in the cool room.
4. If cheeses are exposed to a high temperature for more than 24 hours after being taken from the press, there is a permanent injury which no subsequent cool curing or cold-storage will remedy.
5. The central curing room plan adds very greatly to the cost of handling the cheese, and does not show any compensating advantages as against cool curing at the factory. The capital expenditure required to erect and equip a central curing room is about equal to the cost of improving the ordinary curing rooms of a group of factories which would be tributary to a central establishment.

To apply this to the individual factory or farm requires that the maturing room is properly insulated and the temperature controlled by artificial refrigeration, which is now within the reach of every cheesemaker.

THE HERB OF THE "SWEET POTATO" (IPOMOEA BATATAS, POIR) AS A FODDER FOR STOCK.

By G. Renner, Botanical Assistant.

In the *Bulletin of the Imperial Central Agricultural Experiment Station, Japan* (Vol. 2, No. 1, Tokio, March, 1914), Mr. T. Katayama invites attention to the value, apparently little known, of the stem and leaves, *i.e.*, the parts above ground, of the "Sweet Potato" as a nutritious fodder for stock. As this must be plentiful wherever the plant is at all extensively grown, and since the Sweet Potato has been cultivated, with some success, even in Victoria, it may be of some interest to become acquainted with the results of the Japanese scientist's experiments which led him to devote an article of upwards of forty pages to the praise, and to an account of the treatment, of the herb for the purpose of its employment as fodder. His compatriots, it appears, whilst assiduously cultivating the plant for the sake of its tubers, look upon the stem and leaves rather as a necessary evil, because of its rank growth soon covering the whole field from which it must be removed as "worthless ballast," or ploughed under, a troublesome task, too, on account of the long tough stems of the plant.

The Sweet Potato" (*Ipomœa Batatas*) is a member of the natural order of *Convolvulaceæ*, which, it may be incidentally mentioned, includes among others our "Bindweed," the pretty "Morning Glory," the redoubtable "Dodder," and about ten other genera indigenous to Australia. There seems to be some doubt as to the original home of this plant, some botanists believing it to be India, whilst Mueller in his *Select Plants* repatriates it in South America. It is certain that it was brought to Europe from Brazil, and that it is now naturalized in most tropical and some sub-tropical countries, where it is cultivated for the sake of its tubers, which are rich in starch, and furnish the so-called "Brazilian Arrowroot." Japan alone produces about 3,000,000 tons of "sweet" potatoes annually on 290,000 hectares (1 hectare=2.471 acres), and for this purpose turns to good account large areas, especially of the smaller islands, which are unfit for rice-cultivation by reason of their mountainous nature.

The amount of starchy contents of the tubers, it is interesting to learn, increases with the latitude, according to Wiesner, that is to say, it is lowest in the tropics, rising to 15 per cent. in the cooler regions; as regards the percentage of sugar the contrary is the case. Of course, there is an irreducible minimum of annual temperature below which the "Sweet Potato" ceases to be productive, thus only northern portions of Victoria would be suitable for its cultivation. Inquiries, made at the Government Statist's Office as to the quantity still grown in Victoria, elicited the information that the amount is negligible. But, to return to the consideration of the feeding-value of the plant itself: Mr. Katayama estimates the quantity of green material, that is to say, the aggregate weight of stem and leaves, per hectare at 13 tons. To render such vast quantities a source of blessing rather than a nuisance, he instituted carefully conducted experiments in order to determine the exact feeding

value and dietetic effects of the herb, both in its green and in its dry states, on the animal's body and health, and the results lead him to believe that the fresh stems and leaves of the "Sweet Potato" are a rather "watery" fodder resembling in composition the leaves of the sugar-beet, containing tannin, however, instead of oxalic acid. They must, however, be given with caution, the best method being to mix them with an equal bulk of dry hay or straw in order to avoid possible drastic effects. He, himself, has not noticed any unpleasant results arising, even from the exclusive use of the green portions in the fresh state, and he specially mentions that, in some regions, milch cows and pigs are fed, for long periods, with large quantities of the fresh material with the best results. It is, however, the dried material with which he is specially concerned, and which he desires particularly to bring under the notice of the stock-owner.

He recommends that the green herb be gathered, preferably at the time when the tubers are harvested, and then be spread out to dry in the air. The time and space required for the purpose are the only objectionable features, to avoid which he suggests, as an alternative, siloing of the material. Of this more anon. In his experiments he spread the stems and leaves thinly on straw mats and succeeded, in fair weather, with an average day temperature of 13 to 19 centigrades (=55.4 to 66.2 Fahrenheit respectively) in obtaining within ten days a "straw" of fair consistency. (A quantity he caused to be dried by the aid of hot air in cylinders. This manner of exsiccation, however, not being of immediate practical value to the grower, will be left out of consideration in this paper.)

The air-dried herb has a fine "aroma," and is gladly eaten by stock with such gratifying results as led the experimenter to believe that its feeding-value equals that of dry hay of fair quality. It would be best to store it as soon as air-dry so as to avoid leaching and deterioration of the leaves.

Now, as to its lending itself well to preservation in the silo, Mr. Katayama was able to prove by experiments, carried out as carefully as those with the air-dried material, that fine ensilage may be produced by filling the silo in the customary manner with the closely packed material, previously reduced, say, in a chaffcutter, to small pieces. The air is admitted as little as possible. Under such conditions he was able to obtain, in approximately five months, a pleasantly smelling and wholesome ensilage which was, with one exception, readily and even greedily eaten and well digested by the animals experimented with, and, even in the exceptional case the taste for it was soon acquired and the fodder thereafter well liked. The loss in nutritive material, suffered by the ensilage in the process of fermentation amounted only to about 6 per cent., a most satisfactory result. It is advisable to remove from the silo, for the purpose of feeding it to the animals, only just about the quantity required for immediate consumption, since it is not improved by keeping.

As all these results are the outcome of experiments conducted under conditions which admit of no doubt as to their scientific correctness, the settler in suitable districts may find it well worth his while to give the "Sweet Potato" a trial both as a producer of starch in the tubers, and as a provider of good and wholesome fodder in its green, that is to say, its above ground, portions.

STATISTICS.

RAINFALL IN VICTORIA.—FOURTH QUARTER, 1914.

TABLE showing average amount of rainfall in each of the 26 Basins or Regions constituting the State of Victoria for each month and the quarter, with the corresponding monthly and quarterly averages for each Basin, deduced from all available records to date.

Basin or District.	October.		November.		December.		Quarter.	
	Total.	Average.	Total.	Average.	Total.	Average.	Total.	Average.
	points.	points.	points.	points.	points.	points.	points.	points.
Glenelg and Wannon Rivers	38	278	155	183	200	158	393	619
Fitzroy, Eumerella, and Merri Rivers	62	277	168	191	173	169	403	637
Hopkins River and Mount Emu Creek	34	234	165	189	265	171	464	594
Mount Elephant and Lake Corangamite	21	229	173	190	262	169	456	588
Cape Otway Forest ...	58	329	265	244	314	231	637	804
Moorabool and Barwon Rivers	26	232	193	194	344	195	563	621
Werribee and Saltwater Rivers	20	225	179	189	419	218	618	632
Yarra River and Dandenong Creek	24	324	279	277	392	323	695	924
Koo-wee-rup Swamp ...	28	327	250	262	355	281	633	870
South Gippsland	34	365	196	266	367	317	597	948
Latrobe and Thomson Rivers	28	356	242	282	323	311	593	949
Macallister and Avon Rivers	26	226	148	195	394	253	568	674
Mitchell River	35	269	199	203	391	238	625	710
Tambo and Nicholson Rivers	54	283	213	183	368	270	635	736
Snowy River	97	337	242	213	442	267	781	817
Murray River	4	174	96	144	217	146	317	464
Mitta Mitta and Kiewa Rivers	15	318	155	261	321	249	491	828
Ovens River	5	317	204	245	291	237	500	799
Goulburn River	5	224	152	186	267	184	424	594
Campaspe River	8	191	170	162	226	179	404	532
Loddon River	3	158	158	136	211	129	372	423
Avoca River	1	143	131	122	121	118	253	383
Avon and Richardson Rivers	2	137	104	114	118	99	224	350
Eastern Wimmera	4	184	146	149	171	131	321	464
Western Wimmera	11	184	156	133	132	98	299	415
Mallee District	2	118	113	92	136	87	251	297
The whole State	20	225	165	169	245	176	425	570

100 points = 1 inch.

H. A. HUNT,
Commonwealth Meteorologist.

VICTORIAN RAINFALL.

In the following table is given the average rainfall in each district in Victoria for the last three months of the year 1914, and also for the year itself, compared with the normal. For the purposes of this table 180 representative stations have been chosen, mainly with due regard to geographical position of the stations, their general peculiarities with respect to rainfall distribution, and their importance from an agricultural stand-point.

From a perusal of the table it will be seen that the month of October was almost devoid of rain, except in Gippsland and the Western District. November showed an excess in most of the northern areas and parts of the west; for the month of December the rainfall throughout the State, with the exception of the northern Mallee and isolated portions of the north-east (more particularly those of higher elevation), was very much above the average, especially so with regard to the western portions of the central district.

District.	——	October.	November.	December.	Year.
		Points.	Points.	Points.	Points.
Mallee North	District Mean.. ..	1	92	78	553
	Normal	109	65	88	1,104
	Per cent. above normal	..	+42	..	..
	,, below ,,	−99	..	−11	−50
Mallee South	District Mean.. ..	0	115	178	750
	Normal	115	89	91	1,359
	Per cent. above normal	..	+29	+96	..
	,, below ,,	−100	..	..	−45
Northern Wimmera ..	District Mean.. ..	1	154	139	846
	Normal	152	110	98	1,600
	Per cnet. above normal	..	+40	−42	..
	,, below ,,	−99	..	..	−47
Southern Wimmera ..	District Mean.. ..	1	140	199	1,029
	Normal	194	136	110	1,980
	Per cent. above normal	..	+3	+81	..
	,, below ,,	−99	..	..	−48
Lower Northern Country	District Mean.. ..	1	136	157	764
	Normal	146	119	107	1,588
	Per cent. above normal	..	+14	+47	..
	,, below ,,	−99	..	..	−52
Upper Northern Country	District Mean.. ..	5	146	239	1,095
	Normal	197	151	131	2,037
	Per cent. above normal	..	..	+82	..
	,, below ,,	−97	−3	..	−46
Lower North-East ..	District Mean.. ..	3	141	347	1,706
	Normal	265	194	189	2,770
	Per cent. above normal	..	..	+84	..
	,, below ,,	−99	−27	..	−38

VICTORIAN RAINFALL—*continued.*

District.	——	October.	November.	December.	Year.
		Points.	Points.	Points.	Points.
Upper North-east ..	District Mean.. ..	15	229	294	2,568
	Normal	383	305	285	4,213
	Per cent. above normal	..	..	+3	..
	,, below ,,	−96	−25	..	−39
East Gippsland ..	District Mean.. ..	65	221	400	2,336
	Normal	308	226	273	3,049
	Per cent. above normal	..	..	+47	..
	,, below ,,	−79	−2	..	−23
West Gippsland ..	District Mean.. ..	21	202	354	2,345
	Normal	330	255	270	3,391
	Per cent. above normal	..	..	+31	..
	,, below ,,	−94	−21	..	−31
East Central	District Mean.. ..	19	255	415	2,567
	Normal	337	273	283	3,467
	Per cent. above normal	..	..	+47	..
	,, below ,,	−94	−7	..	−26
West Central	District Mean.. ..	13	208	317	1,530
	Normal	212	172	157	2,264
	Per cent. above normal	..	+21	+102	..
	,, below ,, ..	−94	..	..	−32
North Central ..	District Mean.. ..	6	195	272	1,495
	Normal	245	199	157	2,583
	Per cent. above normal	..	..	+73	..
	,, below ,, ..	−98	−2	..	−42
Volcanic Plains ..	District Mean ..	16	173	250	1,498
	Normal	240	184	160	2,512
	Per cent. above normal	..	..	+56	..
	,, below ,, ..	−95	−6	..	−40
West Coast	District Mean.. ..	48	200	208	2,084
	Normal	281	193	182	3,049
	Per cent. above normal	..	+4	+14	..
	,, below ,,	−83	..	..	−32

N.B.—100 points = 1 inch.

H. A. HUNT,
Commonwealth Meteorologist.

POTASH FROM WOOL WASHING.

A Bradford correspondent revives a suggestion that wool-washing establishments should put down plants for the recovery of potash from their waste liquor, as is largely done on the Continent.

Although the potash recoverable in the process of wool washing is insignificant in amount compared with the German production from mineral sources, the operation of recovery is profitable, and were desuinting the general practice in Bradford, instead of the rare exception, it is probable that a fair quantity of potash could be obtained.

Carbonate of potassium is the chief constituent of the "suint," or non-fatty portion of the secreted matter which adheres to the wool as it grows on the sheep's back. In this country, suint and grease are usually removed together in one operation, and recovery of the grease only is attempted.

It has been stated that one firm in Bradford alone annually pours down the drain with its waste liquor potash salts to the value of over £25,000.

On the Continent the potash is recoverable by subjecting the wool to a preliminary steeping in cold water, which dissolves the salts and leaves the grease behind. In the Roubaix district the production of potash salts from wool washing is said to amount to considerably over £100,000 annually.

The usual explanations given for the neglect of desuinting in this country are either that it is not worth while, or that cold water steeping tends to make the wool felt, but probably the real reason is the innate conservatism of the English temperament, which repels new ideas, and is reluctant to embark on experiments.—*Fertilizers*, 19th September, 1914.

Wool washing works are situated throughout Australia, and there is no doubt but that thousands of pounds' worth of potash is wasted annually.

FOURTH VICTORIAN EGG-LAYING COMPETITION, BURNLEY, 1914-1915.

MONTHLY REPORT ENDING 14TH FEBRUARY, 1915.

The most notable feature of the past month in connection with the competitions was the extremes of temperatures. The readings taken in the roosting houses varied from 47 to 108 degrees, while the sun reading on one occasion reached 153 degrees.

One hen of the heavy breeds died with the heat on that day.

It speaks volumes for the present-day breeders that the hens as a body performed so well under such trying conditions.

A large number of hens are in full moult, while two or three have finished and again laying. The general health of the birds is good, and taking into consideration the number of birds in moult, the egg output is good.

The rainfall for the month was 55 points.

A. HART,
Chief Poultry Expert.

FOURTH VICTORIAN EGG-LAYING COMPETITION, 1914-1915.

Commencing 15th April, 1914; concluding 14th April, 1915.

CONDUCTED AT THE BURNLEY SCHOOL OF HORTICULTURE.

Pen No. (6 Birds).	Breed.	Owner.	Eggs Laid during Competition.			Position in Competition.
			15th April to 14th Jan.	15th Jan. to 14th Feb.	Total to date—10 months.	
		LIGHT BREEDS.				
		WET MASH.				
25	White Leghorns ..	J. H. Gill	1,304	133	1,437	1
36	,, ..	E. A. Lawson	1,299	135	1,434	2
26	,, ..	Mrs. H. Stevenson ..	1,217	159	1,376	3
10	,, ..	R. Hay	1,185	133	1,318	4
16	,, ..	A. R. Simon	1,192	123	1,315	5
9	,, ..	J. J. West	1,192	111	1,303	6
17	,, ..	F. Doklissen	1,143	139	1,282	7
11	,, ..	C. J. Jackson	1,120	153	1,273	8
19	,, ..	Marville Poultry Farm ..	1,127	145	1,272	9
4	,, ..	Giddy and Son	1,129	135	1,264	10
33	,, ..	W. G. Osborne	1,123	140	1,263	11
40	,, ..	J. Schwabb	1,125	124	1,249	12
45	,, ..	H. C. Brock	1,113	134	1,247	13
37	,, ..	S. Brown	1,113	129	1,242	14
29	,, ..	V. Little	1,104	120	1,224	15
23	,, ..	S. Buscumb	1,078	135	1,213	16
35	,, ..	W. Tatterson	1,084	110	1,194	17
1	,, ..	F. G. O'Bree	1,057	125	1,182	18
15	,, ..	E. Waldon	1,049	127	1,176	19
8	,, ..	F. W. Brine	1,058	114	1,172	20
47	,, ..	W. G. Swift	1,039	128	1,167	21
30	,, ..	G. W. Robbins	1,037	127	1,164	22
20	,, ..	A. W. Hall	1,007	153	1,160	23
44	,, ..	A. Ross	1,064	93	1,157	24
22	,, ..	B. Mitchell	1,014	142	1,156	25
14	,, ..	F. C. Western	986	136	1,122	26
48	,, ..	Bennett and Chapman ..	994	127	1,121	27
28	,, ..	Utility Poultry Farm ..	1,010	110	1,120	28
2	,, ..	J. C. Armstrong ..	998	116	1,114	29
24	,, ..	C. Pyke	1,012	101	1,113	30
34	,, ..	W. A. Rennie	998	107	1,105	31
6	,, ..	C. R. Jones	980	125	1,105	
38	,, ..	G. Hayman	990	114	1,104	33
12	,, ..	A. H. Mould	994	105	1,099	34
3	,, ..	T. A. Pettigrove ..	976	107	1,083	35
32	,, ..	Gleadell Bros.	938	141	1,079	36
18	,, ..	All-lay Poultry Yards ..	946	129	1,075	37
42	,, ..	E. W. Hippe	954	120	1,074	38
41	,, ..	Doncaster Poultry Farm ..	939	132	1,071	39
13	,, ..	H. Hanbury	959	106	1,065	40
5	,, ..	A. Mowatt	931	122	1,053	41
31	,, ..	E. H. Bridge	929	118	1,047	42
43	,, ..	G. Mayberry	884	134	1,018	43
39	,, ..	R. L. Appleford	866	139	1,005	44
21	,, ..	R. A. Lewis	871	117	988	45
49	,, ..	A. Beer	841	112	953	46
50	,, ..	F. G. Silbereisen ..	807	139	946	47
7	,, ..	B. Cohen	766	144	910	48
46	,, ..	C. L. Sharman	763	135	898	49
27	,, ..	Walter M. Bayles ..	773	117	890	50
		Total	51,078	6,320	57,398	

FOURTH VICTORIAN EGG-LAYING COMPETITION, 1914-1915—*continued.*

Pen No. (6 Birds).	Breed.	Owner.	Eggs Laid during Competition.			Position in Competition.
			15th April to 14th Jan.	15th Jan. to 14th Feb.	Total to date—10 months.	
		LIGHT BREEDS—*continued.*				
		DRY MASH.				
60	White Leghorns ..	W. N. O'Mullane ..	1,301	159	1,460	1
55	,, ..	E. A. Lawson ..	1,254	128	1,382	2
51	,, ..	Moritz Bros. ..	1,092	143	1,235	3
53	,, ..	C. Lawson ..	1,093	115	1,208	4
65	,, ..	W. G. Osburne ..	1,117	86	1,203	5
61	,, ..	H. Hanbury ..	1,057	142	1,199	6
58	,, ..	Miss L. Stewart ..	1,060	102	1,162	7
59	,, ..	F. G. Silbereisen ..	973	129	1,102	8
68	,, ..	E. W. Hippe ..	968	131	1,099	9
63	,, ..	Hanslow Bros. ..	979	112	1,091	10
62	,, ..	A. Greenhalgh ..	956	133	1,089	11
52	,, ..	Myola Poultry Farm ..	938	117	1,055	12
70	,, ..	W. H. Robbins ..	921	124	1,045	13
69	,, ..	C. J. Beatty ..	902	134	1,036	14
64	,, ..	E. A. Carne ..	920	115	1,035	15
54	,, ..	G. Carter ..	924	100	1,024	16
67	,, ..	Walter M. Bayles ..	875	138	1,013	17
57	,, ..	C. J. Jackson ..	893	115	1,008	18
66	,, ..	S. Brown ..	641	100	741	19
		Total	18,864	2,323	21,187	
		HEAVY BREEDS.				
		WET MASH.				
77	Black Orpingtons ..	J. McAllan	1,201	130	1,331	1
71	,, ..	J. Ogden	1,104	116	1,220	2
88	,, ..	H. H. Pump	1,109	89	1,198	3
89	,, ..	Marville Poultry Farm ..	1,086	101	1,187	4
84	Rhode Island Reds	J. Mulgrove	1,037	79	1,116	5
87	Black Orpingtons ..	A. Douglas	967	128	1,095	6
81	,, ..	D. Fisher	1,001	93	1,094	7
76	,, ..	W. P. Eckermann ..	971	113	1,084	8
82	,, ..	J. H. Wright	981	94	1,075	9
75	,, ..	Fairdeal Poultry Farm ..	947	96	1,043	10
78	,, ..	J. A. McKinnon ..	902	117	1,019	11
72	,, ..	T. W. Coto	897	106	1,003	12
74	,, ..	S. Brown	905	96	1,001	13
83	,, ..	Cowan Bros.	818	72	890	14
85	Golden Wyandottes	J. C. Mickelburgh ..	691	74	765	15
78	Red Sussex ..	Jorgen Anderson ..	669	77	746	16
79	Barred Plyth. Rocks	Bennett and Chapman ..	632	86	718	17
86	Buff Wyandottes ..	W. G. Swift	473	62	535	18
		Total	16,391	1,729	18,120	
		DRY MASH.				
100	Black Orpingtons ..	D. Fisher	966	87	1,053	1
90	,, ..	J. H. Wright	912	110	1,022	2
98	,, ..	A. Greenhalgh	894	109	1,003	3
97	,, ..	J. McAllan	895	94	989	4
91	,, ..	C. E. Graham	824	88	912	5
94	,, ..	T. W. Coto	830	75	905	6
96	Rhode Island Reds	Myola Poultry Farm ..	807	87	894	7
92	Black Orpingtons ..	Fairdeal Poultry Farm ..	769	96	865	8
93	,, ..	Myola Poultry Farm ..	747	73	820	9
99	White Plyth. Rocks	Mrs. G. R. Bald ..	622	102	724	10
95	,, ..	C. L. Hewitt	429	40	469	11
		Total	8,695	961	9,656	

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ORCHARD AND GARDEN NOTES.

E. E. Pescott, F.L.S., Principal, School of Horticulture, Burnley.

The Orchard.

PLANTING.

In preparing land for planting out—and this should be commenced right away, so as to allow the soil to sweeten—it should be subsoiled, so as to produce good results in after years. Subsoiling will add to the age and vigour of the trees; it will materially increase the crop; and it will considerably lessen the expense of fertilizers. Drainage is another most important factor in successful fruit culture; but while, perhaps, drainage may be delayed for a few years, if the other initial expenses are extensive, it must again be emphasized that proper subsoiling cannot be carried out after the trees are planted.

GREEN MANURES.

The exceedingly dry months of January and February will have had the effect of considerably weakening the soils, and reducing the humus content. It will be advisable wherever at all possible to put in a crop of green manure to supply humus, nitrogen, and other beneficial factors to the soil. This should be done as soon as the fruit is off the trees, and the earlier the better.

An early crop is a distinct advantage. The cover crop should make good growth before winter sets in, as the plants make very little headway in the cold weather, and they require to be ploughed in as soon as the ground is dry enough in the early spring. It will thus be seen that it is necessary to get a good autumn growth, as dense as possible, and one which will well cover the surface before winter.

PESTS.

Rust-infected plum and peach leaves, as well as the foliage of stone fruits that have been attacked by this and other fungus diseases, such as shothole, &c., should be burned if possible. This will minimize the possibility of future attacks. The same treatment should be given to foliage where red spider or the bryobia mite have been in evidence.

It may appear somewhat early to think of dealing with peach aphis. But our knowledge of its habits and the necessary sprays to combat it is increasing every year; and it is most apparent that, if the pest is to be attacked with a red oil emulsion, the mixture must be used earlier than hitherto.

It is recognised that one of the easiest and most useful methods of dealing with this pest is to spray the trees in their dormant stage with red oil emulsion. In orchards where, some years ago, half-a-dozen sprayings with a nicotine spray were given, often with very little visible effect, a marvellous change has been effected by the use of red oil in winter. One spraying has been effective in almost clearing out the pest; and where the aphides have reappeared in the spring time, their numbers have been so small that a light spraying with nicotine solution has been all that is necessary. This applies to both green and black aphis.

Vegetable Garden.

All vacant plots should be given a liberal dressing of stable manure, and then well and deeply dug. For winter growth, the beds should be elevated somewhat above the ordinary summer level. That is, the path surface may be on a lower level, the plot soil being well thrown up and boldly ridged. This will give a certain amount of drainage, and will insure warmer and better soil; the vegetables should succeed more in this class of bed than any other. The vegetable garden, and also the seed beds, should be kept free of any weeds, and a good cultivation kept up all through. Seedlings of cabbages, cauliflowers, lettuce, and celery may be transplanted out; and seeds of cabbage, cauliflower, lettuce, early peas, swede turnips, carrot, parsnip, and early onions may be sown.

Flower Garden.

The various plants in the flower garden will require liberal food supplies at the present time. The soil having been so frequently watered during summer, the food supplies of various plants have been considerably reduced by the process of "washing out"; and as it is the season of the year when the most popular flowers of the year will be blooming, viz., dahlias, chrysanthemums, and roses, the plants will require a good stimulus. Liquid manures should be used in preference; and these should always be used in a weak solution first, gradually making it stronger as the plant becomes accustomed to the feeding. Once a week is sufficient for liquid manures, and the plants should never be excessively fed. Animal manures may be prepared for liquid manures by soaking for a few days at the rate of 1 lb. of well-rotted and well-preserved manure in one gallon of water. A few handfuls of soot thrown in this makes a great improvement in the food. If ordinary chemical manures, such as nitrate of soda, superphosphate, or sulphate of ammonia, be used, the portion of one ounce to four gallons will be ample for the weekly supply. Excessive manuring and over-feeding tend to gross growth in floriculture. All classes of spring flowering bulbs may now be planted. In bulb planting the bulbs should not come in contact with any manure. The manure should have been some time previously dug well in and mixed with the soil, and all heat should have disappeared. If much manure is required it should be placed below the bulb, so that the roots may ultimately penetrate to it. Bulbs thrive in sandy soils, and where the soil is heavy a little sand may be added with advantage. Bulbs should not be planted too deeply; the depth to plant is generally regulated by the size of the bulb. Such bulbs as freezias may be covered with only an inch of soil, while larger bulbs may be somewhat deeper. Wherever aphis and red spider occur the plants should be well sprayed with benzole emulsion, nicotine, "Pestend," "Soaperine," or some other preventive, in order to protect the coming flowers. Mildew attacks on the rose should also be warded off by the use of sulphur. The sulphur may either be dusted on the plant or it may be scattered on the ground around and under the plant. March is the month when the showy and fine summer annuals are at their best. The asters and zinnias should be very fine; and these, combined with salpiglossis, miniature annual and herbaceous sunflowers, phlox, and many other popular hardy annuals, are all now at their best. These will require a fair quantity of water and manure mulching; and the plants

will be considerably helped if the blooms which have passed their prime are kept cut off.

All hardy annual, biennial, and perennial seeds may now be planted; among these are dianthus, candytuft, sweet peas, Iceland poppies, anemone, ranunculus, stock, wallflower, columbine, foxglove, phlox, pentstemon, pansy, gallardia, &c.

In planting sweet peas, the soil should be fairly well watered beforehand, so that it is well moist right through. The best result will be obtained if they are first planted in boxes or pots, and when two or three inches high transplanted out singly into their permanent situation. In planting out the seedlings the soil should be well prepared, so that the roots may have a free run in all directions. The seedlings should be given ample room, having a space of at least nine inches between each plant. Staking should proceed at an early stage, and the plants should be encouraged to climb from the beginning.

REMINDERS FOR APRIL.

Live Stock.

HORSES.—Those stabled should be fed liberally. Food of a more stimulating nature can now be given to get them well over the "changing coat" season. Those doing fast or heavy work should be clipped; if not wholly, then trace high. The legs should not be clipped. Those not rugged on coming into the stable at night sweating freely should be wiped down and in half-an-hour's time rugged or covered with bags until the coat is dry. Yearling colts if vigorous and well grown may be castrated. Weaned foals should have a little crushed oats daily, if available. Horses to be turned out during winter should not be clipped. Their mouths and feet should be examined and attended to where necessary.

CATTLE.—As the nights become colder the dairy cows should be rugged. The rugs should be removed in day-time when the shade temperature reaches 60 degrees. If new grass is plentiful, give a ration of hay or straw, whole or chaffed, to counteract the purging effects of young grass. Cows may now be spayed.

PIGS.—Sows not already served should be put to the boar. Supply all pigs with plenty of bedding, and see that sties are warm and well ventilated. Supply sows liberally with grain. Castrate young boars.

SHEEP.—After such a season as just passed through the bulk of the lambing will be erratic and late, but, where early lambs can be produced, transfer the ewes with lambs at foot to best feed as soon as dropped. Plant fodder crops and fatten all possible; the demand will be extreme for all classes of mutton. Castrate ram lambs when a few days old; defer tailing them until ewe lambs are ready. After rain, when dust is settled, clear wool from the eyes of young merino sheep and from the udders of stud ewes about to lamb. Drench sick weaners, and put them into hospital paddock, and all inferior fleeced sheep into fattening paddock.

POULTRY.—Do not feed much grain this month—soft food aids moult; add a teaspoonful of linseed to each bird's ration once daily. The more exercise the hens get the better they moult. Remove all male birds from pens. Add to drinking water one packet Epsom salts to twenty birds. Keep a sharp look out for chicken pox. Forward pullets should now be in their winter quarters, with plenty of scratching litter, and fed liberally—including ration of animal food. Grit shell and charcoal should always be available.

Cultivation.

FARM.—Dig potatoes as they mature. Cart out and spread stable manure. Finish preparation of land for main cereal crops. Sow Chou Moellier seed in beds for transplanting. Sow the following mixture per acre for green feed during the winter months for the dairy herd:—1½ bushels, Oats; ½ bushel, Cape Barley; ½ bushel, Tick Beans; ½ bushel, Vetches. Sow Giant Drumhead Cabbage for transplanting (1 lb. sufficient for 1 acre, in rows 3 feet apart); provided the soil is in good friable condition, plants from seed sown last month

should be planted out. Sow wheat and oats according to locality; also rape for winter feed or green manuring. Prepare clean seed-bed for lucerne; and sow Hunter River, Arabian, or Peruvian seed, free from dodder, in drills 7 inches apart and at the rate of 12-16 lbs. of seed per acre. Sow permanent pastures with grasses and clovers.

ORCHARD.—Prepare land for planting; plough deeply and sub-soil. Plant legumes for green manure. Plant out strawberries. Clean up Codlin Moth from trees as soon as all fruit is gathered.

FLOWER GARDEN.—Plant out evergreen shrubs, trees, and Australian plants, divisions of herbaceous plants, seedlings, layers, and rooted cuttings. Feed *chrysanthemums* with liquid manure weekly until flowers begin to open. Prepare land for future plantings of roses and shrubs.

VEGETABLE GARDEN.—Plant out seedlings from the seed beds. Dig all vacant spaces roughly. Sow onions for early crop; also peas and broad beans. Clean out asparagus beds wherever the seeds are ripening.

VINEYARD.—Consideration must be given to manuring; early application is strongly urged. Peas, &c., for green manuring should be sown as soon as possible.

Cellars.—Cleanliness is emphatically urged. Carefully remove all fermentable refuse—skins, lees, skimmings, &c. Such odds and ends favour multiplication of vinegar flies (*Drosophila funebris*). If present, destroy these with formalin or insecticide powders. A little bisulphite or sulphurous acid in washing water is recommended; also free use of lime on floors, &c. See February *Journal*, 1914.

ALSATIAN POTASH.

In the *Progres Agricole* of 18th October, 1914, Professor L. Degrully, of the Montpellier National School of Agriculture (France), discusses the advisability of manuring young vineyards during the winter following their field grafting.

He decides in favour of manuring, in order to insure a well-developed root system and solid frame, but advises moderation and the application of half the quantity of manure usually allowed for vines in full bearing. He comments on the difficulty in procuring potash sales, now that the war has shut off supplies from the mines of Strassfurth, in Germany, which have hitherto been the main source of potash used by French agriculture. "Potash must therefore be sought either in organic manures, which contain more or less of it (and sometimes none at all), according to their origin, or in nitrate of potash, which comes to us from India, Egypt, and other countries of the Far East." He also recommends the use of gypsum to unlock soil reserves of potash, and recalls "that nitrates seem to play a similar part, according to experiments conducted in England and Switzerland."

As regards the future, "The question is already solved," says Professor Degrully, who shows with cheery optimism how the recovery of her lost Provinces will render French agriculture independent of Strassfurth. "Upper Alsace . . . contains very important deposits, which have been explored within the last few years by the Alsatian Geological Service. . . . Prospecting has shown the Wittelsheim Basin to contain 1,472,000,000 metric tons of mineral, which, with an average test of 22 per cent. potash, would represent 300,000,000 tons of pure potash. Admitting that the world's consumption were to remain as it is to-day, Wittelsheim would suffice for the requirements of the next 493 years. Upper Alsace will shortly have once again become French soil, and in it we shall easily find all the potassic manures necessary for our cultures."